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US Army Corps of Engineers

Toxic and Hazardous Materials Agency

Enhanced Preliminary Assessment Report:

Presidio of San Francisco Military Reservation San Francisco, California

November 1989

prepared for

Commander, U.S. Army Toxic and Hazardous Materials Agency,
Aberdeen Proving Ground, Maryland 21010-5401

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19 ABSTRACT (Continue on reverse if necessary and identify by block number) Argonne National Laboratory has conducted an enhanced preliminary assessment of Presidio Military Reservation, located in San Francisco, CA. The objectives of the enhanced preliminary assessment include: identifying and characterizing all environmentally significant operations with respect to known or suspected releases of contaminants to the environment, identifying areas of contamination that may require immediate action, identifying those areas which may require additional investigation, identifying other actions that may be necessary to address and resolve all identified environmental problems, and identifying other environmental concerns that may present impediments to the expeditious transfer or this property. Based on currently available information, Presidio does not present any imminent or substantial threat to human health or the environment. However, additional environmental investigations are recommended to fully characterize the environmental impacts from on-site landfills and underground storage tanks. Remedial actions to address known soil and groundwater contamination are also necessary.

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GLOSSARY OF ACRONYMS USED IN THIS WORK

AAFES	Army Air Force Exchange Service
AEHA	Army Environmental Hygiene Agency
AEMC	American Environmental Management Corporation
AMCCOM	Armament, Munitions, and Chemical Command
ANL	Argonne National Laboratory
AQCR	Air Quality Control Region
BAAQMD	Bay Area Air Quality Management District
BLM	Bureau of Land Management
Btu	British thermal unit
CAC	combined available chlorine
CB	chemical/biological
C and D	construction and demolition
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFC	chlorofluorocarbon
CFR	Code of Federal Regulations
CHAMPUS	Civilian Health and Medical Program of the Uniformed Services
CONEX	Container Express
CWQCB	California Water Quality Control Board
DARCOM	U.S. Army Material Development and Readiness Command
DEH	Directorate of Engineering and Housing [formerly called Directorate of Facilities Engineering (DFAE)]
DOD	Department of Defense
DOI	Department of the Interior
DOIM	Directorate of Information Management

DOL	Directorate of Logistics [formerly called Directorate of Industrial Operations (DIO)]
DPCA	Directorate of Personnel and Community Activities
DPDO	Defense Property Disposal Office
DPTM	Directorate of Plans, Training, and Mobilization [formerly called Directorate of Plans, Training, and Security (DPTS)]
DRMO	Defense Reutilization and Marketing Office
DRPO	Defense Resources Planning Operation
EPA	Environmental Protection Agency
ESO	environmentally significant operation
FAC	free available chlorine
FORSCOM	Forces Command
FR	Federal Register
GGNRA	Golden Gate National Recreation Area
gpm/ft^2	gallons per minute per square foot
HABS	Historic American Buildings Survey
HSWA	Hazardous and Solid Waste Amendments of 1984
HW	hazardous waste
HQ	headquarters
IFC	integrated fire control
IPM	Integrated Pest Management
IRP	Installation Restoration Program
ISCP	Installation Spill Contingency Plan
LAIR	Letterman Army Institute of Research
LAMC	Letterman Army Medical Center
m	meter(s)
MCL	maximum containment level
MG	million gallon(s)

mgd	million gallons per day
μg/L	micrograms per liter
mg/L	milligrams per liter
MLA	missile launcher area
MOU	Memorandum of Understanding
MRL	minimum reporting limit
NAAQS	National Ambient Air Quality Standards
NAER	National Architectural and Engineering Record
ND	not detected
NEPA	National Environmental Policy Act
NIDWRS	National Interim Drinking Water Regulation Standards
NIPDWR	National Interim Primary Drinking Water Regulations
NO_x	Oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NRC	Nuclear Regulatory Commission
NSDWR	National Secondary Drinking Water Regulations
PA	preliminary assessment
PCB	polychlorinated biphenyl
PCDD	polychlorinated dibenzo-p-dioxin
PCDF	polychlorinated dibenzofuran
PHSH	Public Health Service Hospital
POL	petroleum, oils, and lubricants
ppb	parts per billion
ppm	parts per million
PSF	Presidio of San Francisco

RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
SCP	Spill Contingency Plan
SOP	standing operating procedure
SPCC	Spill Prevention, Control, and Countermeasure
SPCCP	Spill Prevention, Control, and Countermeasure Plan
STP	sewage treatment plant
TCE	trichloroethylene
THM	trihalomethanes
THMFP	trihalomethane formation potential
TPH	total petroleum hydrocarbons
TTHM	total trihalomethanes
TTLC	total threshold limit concentration
2,4,5-T	2,4,5-trichlorophenoxypropionic acid
USAEHA	U.S. Army Environmental Hygiene Agency
USAINSCOM CI/SIGSEC	U.S. Army Intelligence/Security Command Counterintelligence/ Signal Security Support Battalion
USAMDC	U.S. Army Medical Research and Development Command
USARC	U.S. Army Reserve Center
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
USPHSH	U.S. Public Health Services Hospital
UST	underground storage tank
WPA	Works Progress Administration
WTP	water treatment plant
WWI	World War I

WWII	World War II
yd	yard(s)

SUMMARY

Argonne National Laboratory (ANL) has performed an enhanced preliminary assessment (PA) of the Presidio Military Reservation, San Francisco, Calif. The Presidio of San Francisco (PSF) has four subinstallations -- East Fort Baker, Parks Reserve Forces Training Area, Rio Vista Reserve Training Area, and Hamilton Army Airfield; these subinstallations are not included in the current assessment, however. This enhanced preliminary assessment was carried out in support of the anticipated closure and realignment of the PSF as directed by the Defense Authorization Amendments and Base Closure and Realignment Act, Public Law 100-526.

The assessment is based on Army records for the PSF that were made available to ANL, relevant information on the surrounding area obtained from appropriate informational and regulatory agencies, interviews with knowledgeable PSF personnel, and the personal observations of ANL investigators. The objectives of this assessment include identifying and characterizing all environmentally significant operations, identifying areas of environmental contamination that may require immediate remedial actions, identifying additional investigations that may be necessary to fully characterize potential environmental problems, identifying other actions which may be necessary to resolve all identified environmental problems, and identifying other environmental concerns that may present impediments to the expeditious transfer of this property.

The PSF is located in the city of San Francisco, at the northern tip of the San Francisco Peninsula and the south end of the Golden Gate Bridge. The installation occupies approximately 1,800 acres bounded on the north by San Francisco Bay, on the west by the Pacific Ocean, and on the east and south by residential districts of San Francisco. The PSF currently functions as headquarters for the Sixth U.S. Army and hosts activities carried on by a number of other tenants, including the Letterman Army Medical Center (LAMC) and the Letterman Army Institute of Research (LAIR).

Major findings of the current assessment are as follows. The PSF presents no imminent or substantial threat to human health or the environment. No emergency remedial actions are warranted. However, it was determined that environmental degradation has taken place at PSF and that remedial actions are necessary as the result of prior contaminant releases. It was further determined that additional studies and investigations are necessary to characterize potential environmental releases from PSF. Finally, it was concluded that modifications to some current activities at PSF can accomplish a reduction in the potential for future releases of contaminants to the environment.

To meet PSF needs for potable water, the installation relies on three sources: surface water recovered from Lobos Creek, which runs along the southern boundary of the installation; groundwater withdrawn from wells located in the southwestern corner of the installation; and treated water supplied by the city of San Francisco. Although conditions of groundwater contamination exist at the PSF, neither its current potable groundwater wells nor Lobos Creek are in any way presently jeopardized by that contamination. Furthermore, both Lobos Creek and the potable well field are ideally situated so as to be isolated from adverse environmental impacts of ongoing PSF

activities. However, additional aquifer characterization is recommended as a prerequisite to any expansion of groundwater use. Careful inspection of existing groundwater wells not currently in use is also recommended to insure that those wells have been properly sealed against possible contamination.

The most significant instance of environmental degradation at PSF occurs in the maintenance shop area of the installation's air field, Crissy Field. Groundwater contamination has been documented in this area since 1981. Although this condition does not constitute an immediate threat to human health or the environment, a remedial action plan to address and resolve the problem should be developed and implemented. Changes to hazardous-material handling and hazardous-waste management procedures for the facilities operating in this area are recommended to prevent future occurrences of groundwater contamination.

Also significant are contaminant releases resulting from leaking underground gasoline storage tanks at the Army Air Force Exchange Service (AAFES) automotive service station (Bldg. 231). The condition was discovered in 1988. Initial response to this incident involved excavations of the leaking tanks and the removal of substantial amounts of contaminated soils. However, later evaluations of this area estimated that additional contaminated soils are present and should ultimately be removed. This existing contamination in no way presents an immediate threat to health or jeopardizes existing drinking water supplies at PSF. Development and implementation of a remedial action plan is recommended. The specific objectives of that plan should coincide with directives recently issued to PSF by the California Water Quality Board regarding subsurface contamination in this area.

Categorically, underground storage tanks represent the greatest potential for adverse environmental impacts at PSF. It is estimated that more than 200 underground storage tanks are in place at the PSF. Exact locations, specifications, and conditions of many of these tanks are *not* known with any reliability, however. Given that much of PSF is underlain with permeable Dune sands, and given further that the hydrologic conditions are not precisely known, leakages from any of these tanks may result in subsurface contaminations of significant areal extent and possibly subsequent adverse impacts to the PSF drinking water supply system. A systematic survey of underground tanks at PSF should be undertaken, out-of-service tanks should be removed, and any in-service tanks identified as having the potential for adverse impacts should be removed or upgraded.

Landfilling activities at PSF have been numerous and largely undocumented. Like underground tanks, these landfills represent potential points of release of contaminants to groundwater. Two of the landfills are potentially upgradient from the PSF drinking wells. Although no incidents of environmental releases from PSF landfills have been documented, circumstantial evidence suggests that a number of these landfill areas are deserving of additional study and characterization. Specifically, four sites are believed to represent the most significant potential for adverse impacts: the landfill area adjacent to the central magazine, the landfill area immediately west of that area (adjacent to Lincoln Blvd.), the landfill area along the beach at Crissy Field, and the landfill behind (north) of the U.S. Public Health Services Hospital (USPHSH) complex. All of these sites were reportedly operational for some time and are said to have

received chemical wastes in addition to regular solid waste and household trash. At a minimum, additional studies of each of the four sites should determine the following: (1) areal extent of the fill, (2) average and maximum depths of the fill, (3) soils and geologic units underlying the fill area, (4) distance to uppermost groundwater aquifer from the base of the waste fill, and (5) the presence or potential for production of leachate and for its migration from the fill area.

No significant adverse environmental impacts have been associated with the operations of LAMC or LAIR. Wastes of concern generated by those facilities (primarily infectious wastes and radioactive wastes) are managed in an acceptable manner on-site, and safe off-site disposal is provided. No waste-handling investigations are warranted for these areas, although they should be part of systematic installation-wide studies of underground storage tanks and asbestos hazards. Other general remedial investigations recommended in this report may also involve the LAMC and LAIR areas.

It was determined that landfilling has taken place in the area once occupied by the USPHSH, but no adverse impacts or environmental releases have been reported. Wastes of concern deposited in that landfill may have included infectious wastes and possibly asbestos generated by the demolition of structures previously in the area. Because infectious wastes are believed largely to have been incinerated prior to disposal, the landfill is not likely to represent any infectious hazards. It is nevertheless important that the areal extent of this landfill be precisely established to avoid inadvertent excavations of these buried wastes. Furthermore, a cemetery is believed to exist in this area, although its exact location is not known. Studies to establish this cemetery's exact location are recommended. Hazardous conditions also exist in the boiler room of the hospital as a result of badly deteriorated asbestos insulation. Asbestos is said to have been widely used throughout the buildings that once comprised the hospital complex. Remediation of all asbestos hazards in these buildings is recommended.

Finally, PSF management of hazardous materials and hazardous wastes needs to be improved at numerous locations. Individually, these situations represent only minor potential for release of contaminants to the environment. Collectively, however, the impacts may be significant, especially given that the PSF subsurface geology involves a complex, and only partially understood, array of highly permeable Dune sand deposits. Recommendations are provided for removing surface contamination in these various areas and improving the design of the storage facilities to reduce potentials for accidental release of contaminants. Additionally, installation of oil/water separators in the storm drains serving the maintenance complex at Crissy Field would enhance the ability to respond to major spills and also provide continuous passive control over release of contaminants from this area to San Francisco Bay.

1 INTRODUCTION

In October 1988, Congress passed the Defense Authorization Amendments and Base Closure and Realignment Act, Public Law 100-526. This legislation provided the framework for making decisions about military base closures and realignments. The overall objective of the legislation is to close and realign bases so as to maximize savings without impairing the Army's overall military mission. In December 1988, the Defense Secretary's ad hoc Commission on Base Realignment and Closure issued its final report nominating candidate installations. The Commission's recommendations, subsequently approved by Congress, affect 111 Army installations, of which 81 are to be closed, primarily as the result of accommodation of units and facilities being relocated. Among the affected installations is the Presidio of San Francisco (PSF), the subject of this preliminary assessment (PA).

The Commission's summary comments and recommendations with respect to closure of the PSF and realignment of its major functions are contained in Appendix H of the Commission's final report.[1] The relevant passages are as follows:

> The Commission recommends the Presidio of San Francisco, to include Letterman Army Medical Center (LAMC), for closure, primarily because it has no capability to expand, and LAMC is in need of major structural repairs. The Commission believes that it is unlikely that a new hospital will be constructed on the San Francisco side of the Bay Area. The Presidio and LAMC functions can be relocated. The net cost of closure and relocation will be paid back within two years. The Commission expects annual savings to be $74.1 million.
>
> The Commission notes that the installation has 1,416 acres of land under Army control, of which only 36.5 acres can be sold. Public Law 100-80, Section 2331, provides for lease of the salable land to the City of San Francisco for a term of 10 years beginning no later than January 1989. The full value of the 36.5 acres could be realized if the legislation on lease of Presidio lands were repealed.
>
> Presidio is the headquarters for Sixth Army, which provides command and control of regional Reserve-Component forces. LAMC provides medical care for the Bay Area military community, serves as an Army graduate medical training facility, and houses the Letterman Army Institute of Research (LAIR).
>
> The Presidio has no excess administrative-space capacity. Statutory restrictions preclude new construction. Reconstruction is allowed only if the replacement facility is the same size as the existing structure, regardless of mission. Demolition of a like amount of square footage is required for all reconstruction. The status of the Presidio as a federally registered landmark, with approximately 300 historical structures, will affect any future development plans.

The LAMC does not meet seismic standards and upgrading would be very costly. In addition, the Secretary of Defense has recently assigned regional medical responsibility in this area to the Navy. The Navy operates a similar hospital at Oak Knoll on the east side of the Bay Area.

Closure of the Presidio will require action with regard to contaminated sites, polychlorinated biphenyl (PCB) transformers, asbestos, and possible underground storage tank leaks. Cleanup of these sites is covered by the Defense Environmental Restoration Program. Cleanup is independent of the closure. Maintenance of historic sites and the existing agreement with the Golden Gate Recreational Committee will affect property disposal. Adverse environmental impacts are not anticipated for those installations receiving transfers from this action, since comparable activities exist at those sites.

The closure will have minimal impact on local employment.

The Commission recommends the following relocations of major units:

- Headquarters, Sixth Army to Fort Carson, Colorado. This will reduce the high base-operating costs currently experienced at Presidio and place the Sixth Army on a multi-mission installation,

- The medical assets of LAMC to be distributed throughout the Army medical force structure to improve health care at other bases with large active-duty populations, and to reduce costs,

- Recurring health-care requirements normally handled by Letterman to be accommodated by other Service medical faci 'ties in the Bay Area or through Civilian CHAMPUS,

- Letterman Army Institute of Research (LAIR) to be relocated to Fort Detrick, Maryland. The realignment will provide new facilities and consolidate research functions.

Legislative directives require that all base closures and realignments be performed in accordance with applicable provisions of the National Environmental Policy Act (NEPA). As a result, NEPA documentation is being prepared for all properties scheduled to be closed or realigned. The newly formed Base Closure Division of the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) is responsible for supervising the preliminary assessment effort for all affected Army properties. These USATHAMA assessments will subsequently be incorporated into the NEPA documentation being prepared for the properties.

This document is a report of the enhanced preliminary assessment (PA) conducted by Argonne National Laboratory (ANL) at the Presidio of San Francisco Military Reservation (PSF) located in San Francisco, Calif. The term "Presidio of San Francisco" normally refers to the main installation together with four subinstallations: East Fort Baker, Parks Reserve Forces Training Area, Rio Vista Reserve Training Activity, and Hamilton Army Airfield. This assessment, however, covers only the main installation, henceforth referred to as PSF.

Public Law 92-589 governs the disposition of all lands defined as the Presidio of San Francisco. That law specifies that, upon the Army's decision to relinquish the military use of any portion of land within the Presidio of San Francisco, said land automatically becomes part of the Golden Gate National Recreation Area (GGNRA), to be operated under the auspices of the National Park Service, Department of the Interior (NPS, DOI). However, not all land currently designated as PSF is subject to provisions of that Act. Approximately 36.5 acres in the southwestern corner of PSF, originally the site of the Public Health Services Hospital (PHSH), was added to PSF after the effective date of Public Law 92-589 and thus escapes the provisions of that statute. (This is the potentially saleable land mentioned previously in the Commission's report.)

1.1 AUTHORITY FOR THE PA

The USATHAMA has engaged ANL to support the Base Closure Program by assessing the environmental quality of the installations proposed for closure or realignment. Preliminary assessments are being conducted under the authority of the Defense Department's Installation Restoration Program (IRP); the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 91-510, also known as Superfund; the Superfund Amendments and Reauthorization Act (SARA) of 1986, Public Law 99-499; and the Defense Authorization Amendments and Base Closure and Realignment Act of 1988, Public Law 100-526.

In conducting preliminary assessments, ANL has followed the methodologies and procedures outlined in Phase I of the IRP. Consequently, this PA addresses all documented or suspected incidents of actual or potential release of hazardous or toxic constituents to the environment.

In addition, this PA is "enhanced" to cover topics not normally addressed in a Phase I preliminary assessment. Specifically, this assessment considers and evaluates the following topical areas and issues:

- Status with respect to regulatory compliance,
- Asbestos,
- Polychlorinated biphenyls (PCBs),
- Radon hazards (to be assessed and reported on independently of this study),

- Underground storage tanks,
- Current or potential restraints on facility utilization,
- Environmental issues requiring resolution,
- Health-risk perspectives associated with residential land use, and
- Other environmental concerns that might present impediments to the expeditious "excessing," or transfer and/or release, of federally owned property.

1.2 OBJECTIVES

This enhanced PA is based on existing information from Army in-house records of initial property acquisition, initial construction, and major renovations and remodeling performed by local contractors or by the Army Corps of Engineers. The PA effort does not include the generation of new data. The objectives of the PA include:

- Identifying and characterizing all environmentally significant operations (ESOs),
- Identifying property areas or ESOs that may require a site investigation,
- Identifying ESOs or areas of environmental contamination that may require immediate remedial action,
- Identifying other actions that may be necessary to address and resolve all identified environmental problems, and
- Identifying other environmental concerns that may present impediments to the expeditious transfer of this property.

1.3 PROCEDURES

The PA began with a reconnaissance visit to PSF on June 14-15, 1989, at which time a briefing was held with the Installation Commander and representatives of various facilities operating at PSF. That briefing served to identify the purpose and scope of the preliminary assessment effort. A brief record search was also made, and a general installation tour was conducted by the PSF environmental coordinator. Arrangements were also made for interviews to be conducted during the subsequent site visit with past and present personnel having knowledge about critical activities occurring on the PSF. A site inspection was conducted during the week of July 10-14, 1989, at which time additional information was gathered through direct observations of critical activities and interviews with appropriate PSF personnel.[2]

Relevant information from PSF records and files was obtained from the PSF environmental coordinator during both the reconnaissance trip and the site visit. Additional relevant information was provided by the archaeologist for the Golden Gate National Recreational Area and from USATHAMA. Information regarding the environmental characteristics of the area was obtained from the U.S. Geological Survey (USGS) office in Sacramento, Calif. Aerial photographs of PSF were provided by USATHAMA. Finally, information on potential hazardous waste disposal sites in the San Francisco area was provided by the U.S. Environmental Protection Agency (USEPA), Region 9 Office in San Francisco, Calif.

Photographs were taken at PSF as a means of further documenting existing conditions at the times of the reconnaissance trip and the site inspection. These photographs are appended.

1.4 PA REPORT OUTLINE

Section 2 of this preliminary assessment report provides a general description of the facilities studied. Not all PSF facilities or activities are addressed in this assessment. Rather, only those facilities considered environmentally significant are addressed here. Environmental significance is determined by the nature of activities conducted at each facility, the amounts and types of materials present at the facility, and the nature of the wastes routinely produced at the facility. Although the evolution of the PSF as a military garrison has been extensively documented, little of that documentation has been developed from a perspective of environmental impact. Nevertheless, a brief history of PSF is provided.

There has been one assessment of PSF conducted under the auspices of the USATHAMA Installation Restoration Program: the 1983 Installation Assessment of Presidio of San Francisco.[3] There have also been a number of environmental studies and evaluations that served to document environmental impacts from various PSF facilities and from certain events. These studies are identified and referenced in Sec. 2 (and summarized in Appendix A). Section 2 provides a brief description of the environmental features of PSF and its demographic and geologic settings. Also summarized are various Army inter-agency communications and those between PSF and local environmental regulatory officials relating to environmental issues and releases associated with PSF.

Section 3 identifies all ESOs, both past and current, which are associated with PSF. Included in this section are discussions of all facility operations that generate wastes of concern. Also identified are all situations of storage of hazardous materials at PSF and spills of such materials which have occurred in the past. Current waste-management procedures are discussed.

Sections 4, 5, and 6 crystallize the chief environmental facts and judgments of this assessment. Section 4 discusses all known or suspected releases to the environment from PSF activities. Section 5 provides conclusions regarding current environmental impacts and discusses the potential for future impacts to the environment. Section 6 provides recommendations for resolving all outstanding environmental issues associated with PSF, identifies actions that will eliminate or reduce the potential for future

environmental releases, and identifies additional environmental studies that are warranted or necessary for complete characterizations of known or suspected environmental impacts.

Following the appended discussion of past environmental studies, in Appendix A, are several sets of backup information. Official documentation of the relationship at PSF of the Army and the National Park Service appears in Appendix B. Appendix C through Appendix F contain relevant legal documents governing environmental and other activities on the installation. Appendixes G and H pertain to underground storage tanks, Appendix I to pesticides, Appendix J to 1988 research on PSF water, and Appendix K to an inventory of hazardous materials. Appended PSF photos appear in Appendix L.

2 PROPERTY CHARACTERIZATION

2.1 GENERAL PROPERTY INFORMATION

2.1.1 Property Location and Identification

The Presidio of San Francisco is located in the city of San Francisco, at the northern tip of the San Francisco Peninsula and the south end of the Golden Gate Bridge. The installation occupies approximately 1,800 acres, including about 375 acres submerged under water. It is bounded by San Francisco Bay on the north and the Pacific Ocean on the west. Residential areas of San Francisco lie to the east and south. The property is fenced, but it is open to the public at all times. Elevated highways U.S. 101 and Park Presidio Blvd. (State Highway 1) divide the PSF into three sections as they form the approaches to the Golden Gate Bridge Toll Plaza.

Figures 2-1 and 2-2 are, respectively, a vicinity map and general site plan of the PSF.

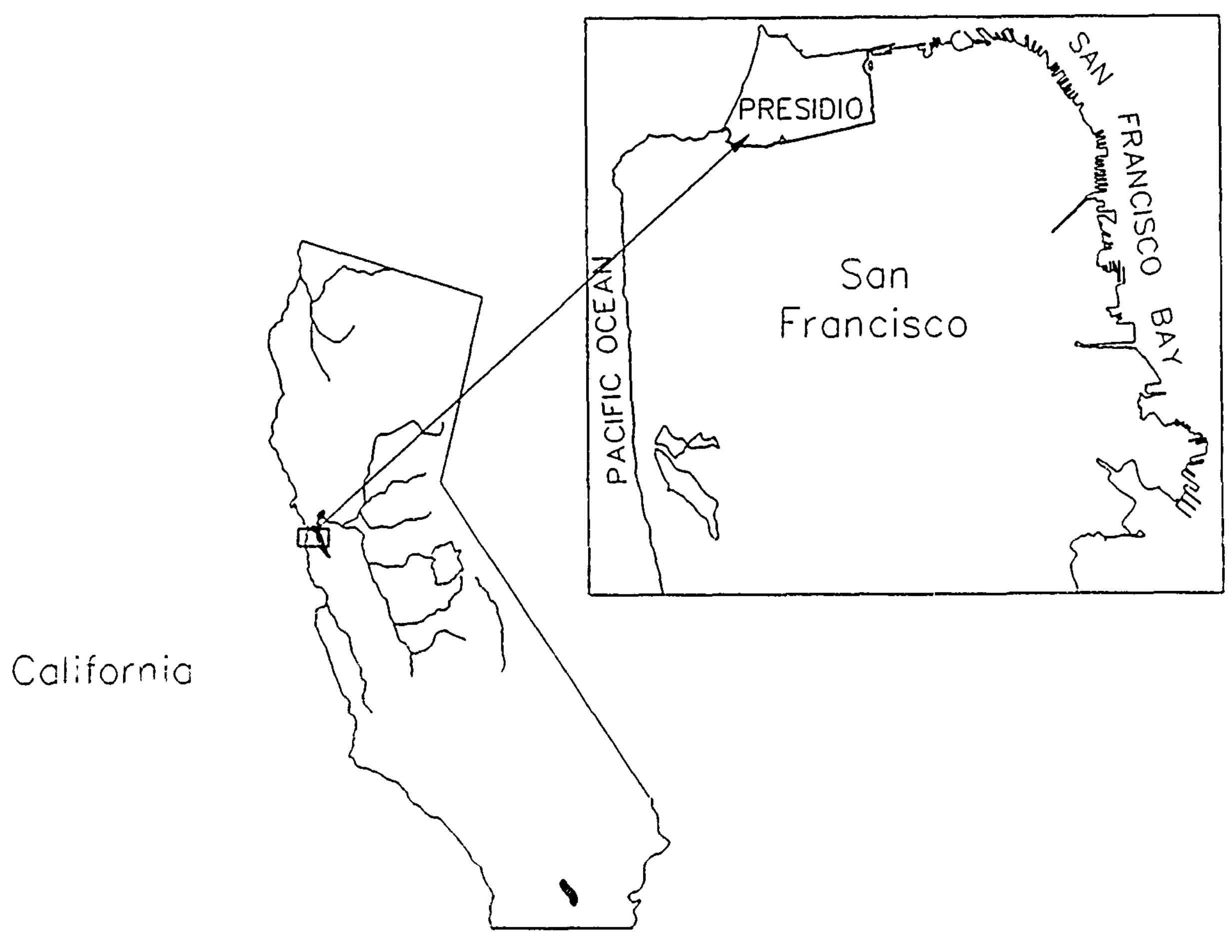
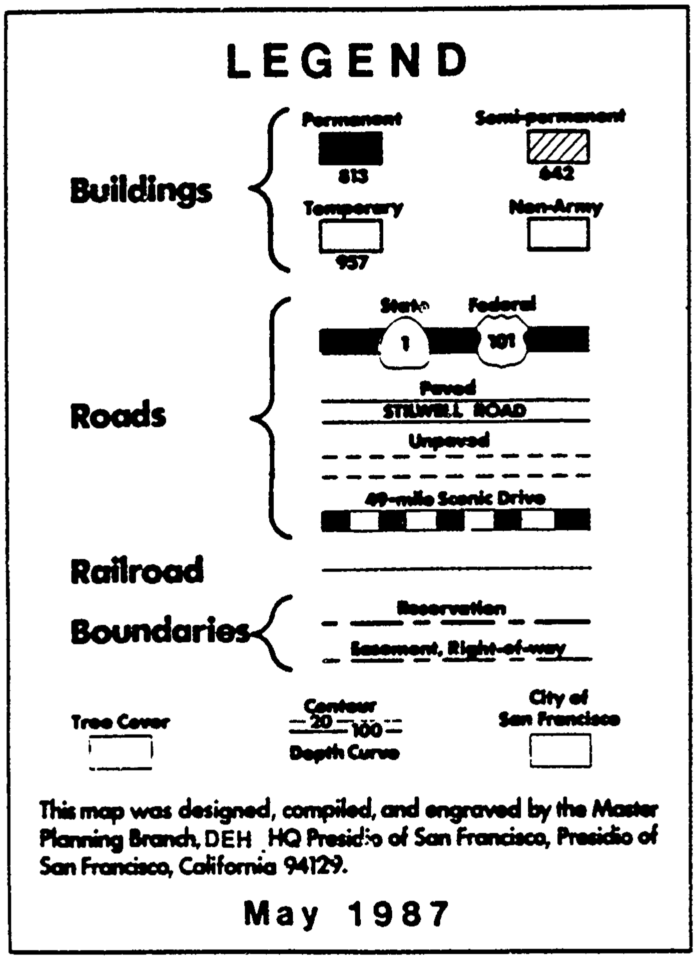


FIGURE 2-1 General Vicinity Map of PSF



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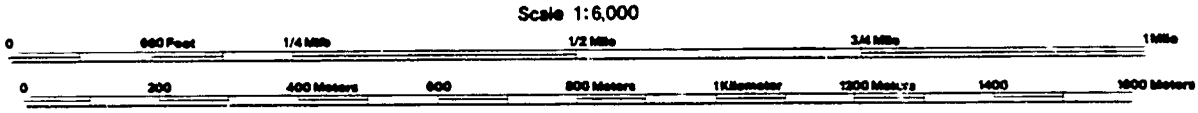


Map compiled from ORTHOPHOTOGRAPHS

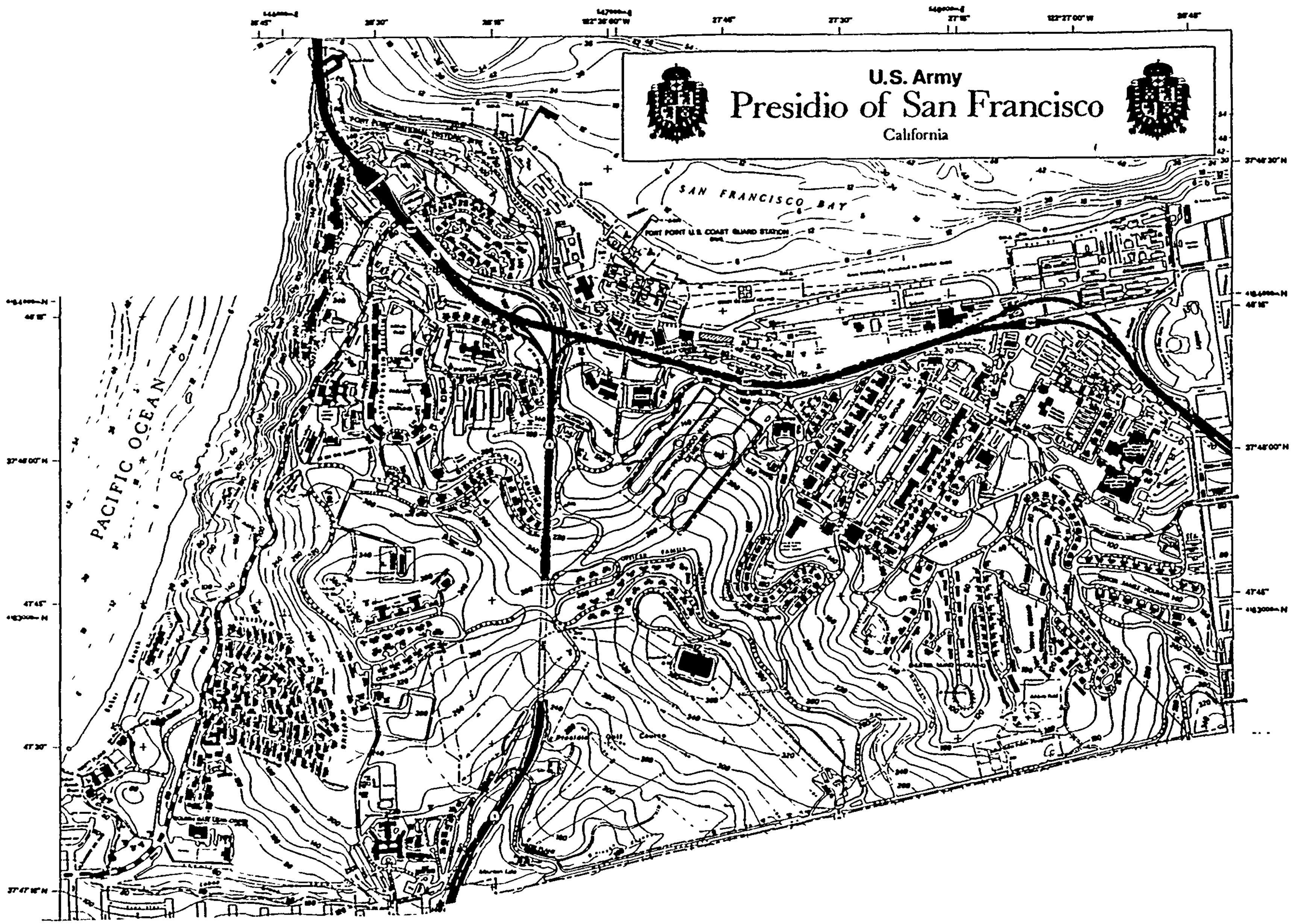


FIGURE 2-2 General Site Plan for PSF

2.1.2 Current Mission and Status

The PSF currently has several active missions. It serves as headquarters for the Sixth U.S. Army. It is home to Letterman Army Medical Center (LAMC) and Letterman Army Institute of Research (LAIR). In addition, it provides facilities for the permanent staff support of many Army field operation agencies and activities.[4] The major directorates and commands under the PSF Commander are listed in Table 2-1.[3]

The functions of the directorates having environmentally significant operations are described briefly below.[3] (PSF personnel have provided updates and revisions for the below-listed directorates.)

1. Directorate of Plans, Training, and Mobilization (DPTM) — responsible for training, operations, aviation, training aids, and audio-visual functions. Duties include scheduling and management of training areas, range control, and production of graphics, photographs, and training aids.

2. Directorate of Logistics (DOL) (formerly Directorate of Industrial Operations [DIO]) — supervises, plans, develops, and directs supply, laundry, transportation, maintenance, subsistence, food service, procurement, and ammunitions supply, storage, and surveillance.

3. Directorate of Engineering and Housing (DEH) (formerly the Directorate of Facilities Engineering [DFAE]) — directs, supervises, and controls all maintenance, repair, and minor construction facilities; directs family housing; coordinates and supervises environmental protection and enhancement activities.

4. Directorate of Personnel and Community Activities (DPCA) — provides installation-wide printing services and recreational opportunities (e.g., automotive hobby shop).

A list outlining current tenant activities and their environmental significance is given in Table 2-2.

The PSF has served as a military garrison since 1776, under first the Spanish, then Mexican, and finally the American flags. Because of this, many of the buildings are of historical and architectural significance. The site is well conceived, with much park-like open space, offering some of the area's most spectacular views of the Golden Gate Bridge and surrounding landforms. Most of the woodlands and grasslands, which contain both native and nonnative species, are maintained in a semi-landscaped state and depend on rain and fog drip for moisture. Ornamental vegetation and approximately 300 acres of maintained lawn are irrigated during the summer months.[4]

Except for the 36.5-acre parcel in the southwestern portion of the installation (site of the former U.S. Public Health Services Hospital), the entire PSF is included in the GGNRA. The PSF nevertheless remains under the jurisdiction of the Department of Defense (DOD). The Park Service General Management Plan for the GGNRA designates

TABLE 2-1 Major Directorates and Commands under the Commander, Presidio of San Francisco

Deputy Commander, PSF
Deputy Commander, Rio Vista Reserve Training Activity
Deputy Commander, Parks Reserve Forces Training Area
Directorate of Logistics (DOL)
Directorate of Engineering and Housing (DEH)
Directorate of Plans, Training, and Mobilization (DPTM)
Directorate of Reserve Components Support
Directorate of Personnel and Community Activities (DPCA)
Directorate of Information Management (DOIM)
Directorate of Contracting
Directorate of Resource Management
Headquarters Commandant
Comptroller
Provost Marshal
Civilian Personnel Office
Public Affairs Office
Staff Judge Advocate
Directorate of Health Services

Source: Ref. 3, with updates and revisions provided by PSF personnel.

TABLE 2-2 Tenant Units and Activities at the Presidio of San Francisco and Their Environmental Significance

Unit[a]	Activity	Environmental Significance?
Sixth Army HQ	Administration and support	No
Sixth Army Band	Music	No
C Company, 864th Engineering Battalion, Law Enforcement Company	Law enforcement	Yes
Joint Military Postal Activity	Mail handling	No
548th Ordnance Detachment	Management and support	No[b]
87th Ordnance Detachment	Explosive ordnance disposal	No[b]
91st Training Division - Reserve	Training of Army Reserves	Yes
124th Army Reserve Command	Training of Army Reserves	Yes
351st Civil Affairs Command	Training of Army Reserves	Yes
Information Systems Command - Presidio	Base communications and electronics services	No
USAINSCOM CI/SIGSEC	Security support	No
6th Region, Criminal Investigation Command	Criminal investigation support	No
HQ Western Sector Military Entrance and Processing Command	Recruiting	No
Letterman Army Medical Center	Hospital facility	Yes

TABLE 2-2 (Cont'd)

Unit[a]	Activity	Environmental Significance?
Letterman Army Institute of Research	Medical research facility	Yes

[a] HQ = headquarters
USAINSCOM CI/SIGSEC = United States Army Intelligence/Security Command Counterintelligence/Signal Security Support Battalion

[b]Although both the 548th and the 87th Ordnance Detachments engage in environmentally significant activities (e.g., disposal of munitions), all such activities are conducted at PSF subinstallations. Both the 548th and the 87th maintain only administrative facilities at the PSF.

Source: Refs. 3 and 5, with updates and revisions provided by PSF personnel.

the portion of the PSF under direct Army jurisdiction as a "special use zone." This means that the PSF, although included within the GGNRA, does not now come under National Park Service jurisdiction; at the same time, management and planning for the site are carried out to preserve the natural, scenic, and recreational values of the GGNRA. The National Park Service reviews PSF development plans to determine their effect on Park Service lands.[4] Figure 2-3 shows the PSF installation boundary and those areas of PSF under Army jurisdiction. Approximately 357 acres of PSF are submerged. This submerged area is under GGNRA jurisdiction.

Because the PSF lies witnin the city of San Francisco, it is addressed within the city's Resource and Open Space Plan. City policies do not have binding force on Army management policies or plans, but the PSF is committed to close coordination with the city on recreation and open space issues and development issues in general.[4]

The PSF is a National Registered Historic Landmark and is listed on the National Register of Historic Places. This designation requires compliance with Sec. 106 of the National Historic Preservation Act of 1966. Therefore, any proposals for the PSF must be studied for their affect on the historic nature of the site. The Maintenance Plan for Historic Buildings within the Presidio of San Francisco Historic Landmark District details guidelines for any modification of the historic properties on site, but no formal preservation program has been defined.[4]

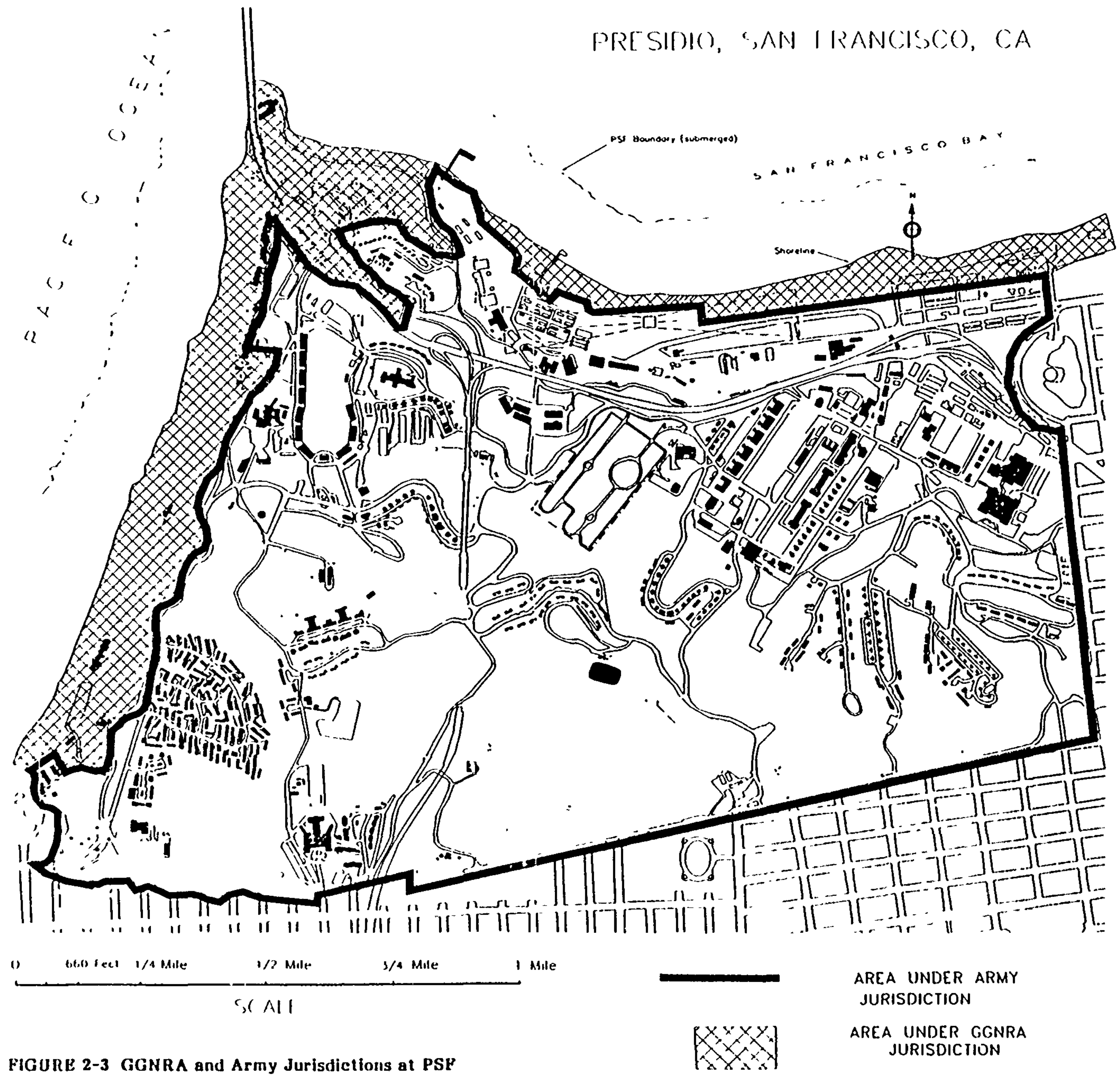


FIGURE 2-3 GGNRA and Army Jurisdictions at PSF

2.2 DESCRIPTION OF CRITICAL FACILITIES

2.2.1 Vehicle/Motor Maintenance Shops

Building 283, Vehicle Maintenance Shop, Plumbing Shop and Metal Working Shop (DEH)[2,3]

Built before WWI, the building presently houses three activities of the DEH: plumbing, metalworking, and vehicle maintenance. The first two activities involve cutting, grinding and punching of metal components. The later involves routine vehicle servicing.

Building 662, Automobile Hobby Shop (DPCA)[2,6]

This vehicle maintenance shop is an automobile hobby shop. Prior to the Army's evolution from animal to mechanized transport, it was part of a stable complex.

Building 920, Motor Repair Shop[2,6]

Built in 1921 as the motor repair shop for the air base at Crissy Field, this is a single-story, concrete and steel frame structure with concrete slab foundation measuring roughly 67 feet x 122 feet. Apart from the addition of easily removable fiberglass sheathing, the structure has undergone little modification. It is now used as a parachute repair shop. During its use as a motor repair shop, this building was the site of generation of waste oils and solvents. However, no specific information about these wastes or their disposition is available.

Building 924, Large Vehicle Maintenance Shop (DOL)[2,6]

This building was built in 1958 to support a Nike-missile antiaircraft defense program in the Bay area. Prior to construction of the Nike facility, the land on which Bldg. 924 stands lay fallow. The building measures approximately 22,000 square feet and is constructed of brick and steel. It is now mainly used for maintenance of large vehicles.

Building 926, Vehicle Maintenance Shop (DOL)[2,6]

This building was built in 1921 and was used as an aircraft hangar for the air base at Crissy Field. It has a steel frame structure, of industrial design, covered with corrugated asbestos panels and resting on a concrete slab foundation. The building was rehabilitated in 1961. Except for some fiberglass sheathing on the uppermost portion of the building, it has been modified very little. The building is now used for major bodywork, painting, and battery recharging.

Building 933, Storage[2,6]

Presently used as storage, this building was built in 1921 as a maintenance shop for aircraft and the boiler house for Crissy Field. Corrugated asbestos panels covered the building. The building was rehabilitated in 1961, but it is unclear if the asbestos panels were removed or left intact. There is no documentation regarding the wastes generated at this location or their ultimate disposition. An underground storage tank possibly exists near this building to hold fuel for the boilers. (See Sec. 3.8 for additional discussion of underground storage tanks.)

Building 934, Motor Test Building[2,6]

Built in 1921, this building was rehabilitated in 1961. Presently, it serves as a general maintenance shop for motor vehicles. Reportedly, there is an underground tank with unknown contents in the vicinity of this building.

Building 937, Vehicle Maintenance Shop (DOL)[2,6]

Building 937 was built in 1921 and used as an aircraft hangar for the air base at Crissy Field. It is a steel frame structure of industrial design, covered with corrugated asbestos panels and resting on a concrete slab foundation. Maintenance and repair of aircraft was performed here until 1936, when Crissy Field closed. Currently, the building is used as a vehicle maintenance shop. Approximately 75 vehicles are serviced here per month.

On the north side of Bldg. 937 are three outdoor vehicle-maintenance platforms. The two platforms closest to the building are connected via underground pipes to a 1,000-gallon underground storage tank. The tank at one time was used to store waste oils drained from vehicles undergoing servicing on either of the two ramps. This underground tank, though reportedly no longer in use, is still in place with its associated plumbing. The waste-oil tank is said to be the source of petroleum contamination (of subsurface soils and groundwater) known to exist under Bldg. 937 and under the paved parking areas to the north of the building (see also Secs. 3.4.2 and 3.8, and App. A). The paved surfaces in the vicinity of the three vehicle-maintenance platforms exhibit heavy petroleum staining.

Also adjacent to Bldg. 937 is a 1,000-gallon underground tank said at one time to hold xylene solvent; the solvent was used in the maintenance of sea planes once serviced at Bldg. 937. This tank is no longer used, but there are conflicting reports as to whether it still contains solvent. The integrity of this tank is unknown. (See Sec. 3.8 for additional discussion of underground storage tanks.)

2.2.2 Hazardous Materials/Hazardous Waste Storage Facilities

Building 268, Equipment Storage Barn (DEH)[2]

The equipment storage barn is a three-sided, roofed shed located at the northeast corner of the PSF. It is used as a garage for several large trucks. Numerous cans of latex paint are stored on the asphalt paved floor. Petroleum products have also been stored in this building. The ground is rather heavily stained with accumulated oil and grease.

Buildings 269 and 293, Pesticides (DEH)[3,8]

The use and application of fertilizers and pesticides (insecticides, rodenticides, and herbicides) at PSF are administered by the Entomology Shop operated by the Land Management Branch of DEH. Insecticides and rodenticides are stored in Bldg. 293, and herbicides are stored in a shed adjacent to Bldg. 269. Both buildings are fire-resistant and have impervious concrete floors. Building 293 lacks continuous curbing to contain runoff, and it has no floor drain. Absorbants are used to soak up spills or container leaks occurring inside the building.

Buildings 640 and 634, Hazardous Material Storage (DOL)[3,8]

Building 640 serves as receiving point for DOL materials. Hazardous materials are transported, usually within 24 hours, to Bldg. 634. Building 634 is an 8-year-old, windowless, brick structure with an unbermed concrete floor. Materials are stored on pallets and shelves. The building does not contain spill cleanup and containment equipment or personal protective equipment, as required by the PSF Spill Prevention, Control, and Countermeasure Plan (SPCCP).

Building 680[2]

Leaking or unserviceable transformers awaiting PCB test results are stored in a secured, enclosed, concrete-bermed floor structure near Bldg. 680. The PCB concentration or transformer status is recorded on wire-fastened cardboard tape (labels). Transformers waiting to be put back in service are stored outside. Weather-exposed tags were difficult to read, and some were missing. Transformers exceeding the disposal PCB concentration limit are removed by a hazardous-waste (HW) contractor.

Building 929, Storage Shed[2,6]

Built in 1921 as a gasoline pump house for the air base at Crissy Field, this is a single-story concrete structure measuring 12 feet x 12 feet, with a wood-frame addition. In 1942, four tanks with a total capacity of approximately 10,000 gallons were reportedly removed from below the paved area north of Bldg. 929. There is no

documentation as to whether these tanks had leaked prior to their removal. Presently, the building is used as a storage shed and compressed air plant supporting maintenance activities in the adjacent Bldg. 926. The paved area in front (north) of this building shows heavy oil and grease staining. This paved area is sometimes used for maintenance and spray painting of bulky items and for short-term storage of drummed wastes generated at the nearby DOL maintenance building (Bldg. 926). PSF personnel report that a 10,000-gallon underground storage tank possibly exists at Bldg. 929. (See Sec. 3.8 for additional discussion of underground storage tanks.)

Building 931, Storage[2,6]

Built in 1921 as an armorer's building, this is a single-story concrete structure measuring roughly 20 feet x 30 feet. A hoist monorail at the gable end was added in 1962. At present, the building stores vehicle paints and thinners, including xylene, a required thinner for camouflage paints. The roof of this building leaked severely at one time. When the rainfall is heavy, the water drain next to the building cannot accept the water flow, and the water backs up into the building. However, there have been no documented environmental problems resulting from such water intrusions into the storage area for paints and solvents.

Buildings 949, 950, 973, and 974, Storage Sheds[2,3,6]

These four buildings, all identical in design, are pole buildings without sides built on concrete slabs. The buildings are used for storage of various materials and equipment by both DEH and DOL. The southernmost portion of Bldg. 950 is used to store drummed wastes generated at the nearby DOL maintenance shops (Bldgs. 926 and 937). Although these drums are protected from rainfall, the slab has no spill-containment provision and exhibits heavy petroleum staining.

The DOL performs sandblasting of vehicles and equipment in the open area between Bldgs. 973 and 974. Sandblasting sand is stored in Bldg. 973. There is no provision for containment of the sand and paint particles blown by the sandblasting. Used sand and removed paint lie on the pavement until it is periodically removed for disposal as solid waste. There have been no analyses of this sand-paint waste mixture to determine its hazardousness.

Building 979, Storage (DEH)[2,6]

This building was built in 1921 and was used as a vehicle maintenance shop and gas station by the 170th Military Police (MP) Company. At present, it is used as a DEH storage area for construction materials and paints. (However, the gasoline pump island [Bldg. 975], and presumably the underground tank, are still in place but no longer in use.) In the front and side yard, sand and gravel, cinder blocks, plywood, pipe, railroad ties, chain link fence, and crated and uncrated new transformers are neatly grouped. A small shed with a "Flammables" cabinet houses rust inhibiting paints and primers in gallon cans as well as other combustible materials such as paint thinners and solvents.

Three abandoned above-ground gasoline tanks are known to exist near the building, as are two underground tanks which are currently being used for gasoline and waste oil storage. (See Sec. 3.8 for additional discussion of underground storage tanks.)

Storage Yard (DEH)[2]

This is a large fenced-in, paved storage yard fronting San Francisco Bay and behind the equipment storage barn (Bldg. 268). It is used for temporary storage of discarded household and construction items, as well as drummed wastes. Drummed wastes are stored in the open on pallets. There is no provision for spill-containment in the storage area. The area is drained by storm sewers to San Francisco Bay. There are no oil/water separators in this storm drainage system. On a bimonthly basis, accumulated refuse is hauled away by private contractors for ultimate disposal at approved landfill sites.

2.2.3 Motor Pools and Automotive Service Centers[2,9]

Building 206, Car Wash (AAFES)[2]

Building 206, constructed in 1982, is also operated by private contractor for the Army Air Force Exchange Service (AAFES). The building contains high-pressure vehicle washing equipment (two wash bays inside the structure, a third outside the building to the south). All wash bays are plumbed to the PSF storm sewer network through a two-stage oil-water separator. Oil, grease, and accumulated dirt is removed from the separator as necessary by private contractors for off-site disposal. An underground storage tank of unknown size and status reportedly exists near this building. (See Sec. 3.8 for additional discussion of underground storage tanks.)

Building 207, Gas Station (AAFES)[2]

Building 207, constructed in 1982 is also operated by private contractor (the same contractor as for Bldg. 206). This facility dispenses leaded and unleaded gasoline from three 10,000-gallon underground storage tanks located directly below the dispensing pumps. These tanks have not been tested for integrity, although no leaks are suspected. PSF personnel report that a 400,000-gallon underground tank with unknown contents also possibly exists near this building. (See Sec. 3.8 for additional discussion of underground storage tanks.)

Building 231, Automotive Service Station (AAFES)[2,8]

Building 231 was built in 1950, originally for use as a gas station and automotive service center for privately owned vehicles. Since its initial construction, this facility has been under the control of the AAFES and has been operated by a private contractor. Four underground storage tanks originally located to the north of the building developed

leaks and were removed in 1988, along with a portion of petroleum-contaminated soils from the immediate vicinity of the tanks. The fuel-dispensing pumps once associated with these tanks have also been removed. Subsurface contamination in the area north and east of the original tank location is still suspected, however, because the expected direction of groundwater movement in the area is northeastward toward the Bay.

Currently, no fuel is dispensed at Bldg. 231, but the building houses four service bays and continues to operate. A 500-gallon waste-oil tank (believed to have been installed at the time of initial construction) is located off the southeast corner of the building. Two of the service bays are equipped with hydraulic lifts, with hydraulic fluid reservoirs located below the building's concrete floor. The waste-oil tank has never been tested for integrity, but no leaks are suspected. PSF personnel report that possibly two 2,000-gallon underground storage tanks also exist near the building. (See Sec. 3.8 for additional discussion of underground storage tanks.)

Wastes generated at this facility include all those normally associated with vehicle maintenance: waste oils, waste hydraulic fluids, waste antifreeze solutions, minor amounts of battery electrolytes, and minor amounts of degreasing solvents. All wastes are managed independently of military-derived wastes generated at PSF. The service bay is equipped with a low-pressure parts-degreasing machine. Solvents for this parts washer are provided by Safety-Kleen Corp., which also periodically removes used solvents for recycling off-site. Waste oils are discharged to the underground storage tank and periodically removed by a private contractor for off-site disposal.

Building 1351, Motor Pool and Vehicle Maintenance Shop (C Company 864th Engineering Battalion)[2]

The motor pool is located to the south of the facility identified as Battery Dynamite. C Company, 864th Engineering Battalion, performs limited maintenance and repairs on PSF equipment and facilities at this location and trains for infantry and combat engineering operations involving the use of heavy equipment.

Building 1351 is bordered on two sides by wooded areas. Tanks and trucks are parked on asphalt paved grounds, but no noticeable ground staining from the vehicles was observed. The vehicle maintenance shop, built in the 1950s, is situated to the west of the motor pool. The facility is well maintained and is mostly used for small parts replacement.

2.2.4 Miscellaneous Shops and Buildings

Building 210, Bank/Post Office and Adjacent Burger King Restaurant[2,6]

This building was built in 1900 as a guard post, and is the earliest extant guard post on PSF. It presently houses Wells Fargo Bank and U.S. Postal Services facilities. A Burger King restaurant adjacent to Bldg. 210 is also identified as Bldg. 210.[7]

According to PSF personnel, two leaking underground gasoline-storage tanks, as well as some contaminated soil, were removed from a site adjacent to Bldg. 210 when the site was excavated for construction of the Burger King building. However, PSF personnel have also reported that no documentation exists to substantiate either the removal of the tanks or the testing and removal of contaminated soil. Reportedly, additional testing of the area is needed to identify the total extent of soil contamination still present. PSF personnel indicate that a bacteriological degradation program has been proposed for remediation of the contaminated soil still present in the area. No documentation regarding this proposed biological degradation effort could be located. (See Sec. 3.8 for additional discussion of underground storage tanks.)

Building 228, Dry Cleaners (AAFES)[2,10]

Building 228 is located immediately south of the AAFES Service Station (Bldg. 231). This building is under AAFES control and currently houses the delivery and pickup activiites of a dry cleaners, operated by private contractor. This building was built in 1909 and originally used as a bakery. However, it had long ago been converted for use as a dry cleaning facility.[10] Although dry cleaning equipment is still present in the building, no dry cleaning has taken place in this building for five years. The current operation involves receiving soiled clothing, transporting them to a location off-post for cleaning, and returning the cleaned garments to Bldg. 228 for pickup by customers.

At least two underground tanks have been identified as possibly present outside the building's north wall (from existing plumbing and exposed vent and filler pipes). Probably at least one of these tanks was once used to store dry cleaning solvents (e.g., carbon tetrachloride, trichloroethylene, or perchloroethylene). The exact specifications and current status of the tanks are unknown.

Building 284, Refrigeration/Air Conditioning/Heating Shop, and Electrical Shop (DEH)[2,3]

Minimal bench work is performed in these shops, since most of the work is performed on job sites located throughout the base. The shops are used mainly for storage of tools and supplies. Various blends of refrigerants, mainly chlorofluorocarbons, used for cold storage equipment throughout the installation, are stored at this facility.

Building 285, Paint and Sign Shops (DEH)[2,3]

These shops are used for the painting of signs and miscellaneous articles such as vehicle components and furniture. There is a small room for supplies plus another room for cleaning paint from brushes and utensils. Wastewater generated in this building is discharged to the PSF sanitary sewer system without benefit of treatment or neutralization.

Building 288, Woodworking Shop (DEH)[2]

This shop is used primarily to support carpentry, roofing, and masonry work. Sawing, planing, and sanding wood are the primary activities. Wood preservatives are not used. Except for contact cement, which contains methyl ethyl ketone, and some drywall joint taping and filling material containing asbestos (once used but since discontinued), most materials used in this shop are benign in nature. There is no waste of concern being generated at this shop.

Building 643, Electronic Equipment Maintenance Shop (DOL)[2,3]

Built in 1925 as an aircraft hangar, the building is now a general-purpose maintenance shop. Electronic equipment is cleaned and repaired here.

Building 1047, Laundry Facility (DOL)[2,3,6]

The DOL operated the laundry in Bldg. 1047 until Oct. 1, 1982, when its operation was undertaken by a contractor. The building was built in 1924 as the disinfecting and sterilizing plant for Letterman Hospital. Equipment was removed and the building converted to a laundry in 1937. At present, it is a laundry facility for the hospital.

Building 1167, Furniture Repair Shop (DOL)[2,3]

This shop does stripping and painting of furniture and a small amount of woodwork. It has a wet curtain spray paint booth, which discharges recirculated water to the PSF sanitary sewer after filtration but without benefit of treatment. Accumulated sludges from the spray booth are managed as solid wastes.

Building 1244, Field Printing Plant (DOIM)[2,3]

The field printing plant uses lithographic machines and an automatic film processor for developing photographic film. Film processing wastes are either recycled for silver recovery or, where appropriate, discharged to the sanitary sewer.

2.2.5 Building 1357, Battery Dynamite and Power Plant[2,10]

The Battery Dynamite, Bldg. 1357, was built in 1894-95. It is a reinforced concrete structure, mostly underground, protected by earthwork. This installation was one of two coastal batteries in the United States to experimentally mount "dynamite guns," weapons using compressed air to fire charges of high explosives. The guns originally sat in the open; in 1898, work began on a complex system of earthen traverses and concrete retaining walls to shelter the weapons and a brick power plant containing the engines and air compressors needed to fire the weapons. The original power plant

building collapsed during the 1906 earthquake. A replacement was built in the same year, with reinforced concrete, exhibiting the form and proportions of a Greek temple in simplified detailing.

The original power-generating equipment consisted of two 200-horsepower Keeler water-tube boilers; two Buffalo Forge single-cylinder, noncondensing steam engines; two 100-kilowatt direct-current Western Electric generators; and a four-panel, marble, Walker switchboard. In 1919, the post telephone switchboard occupied one room of the building. During World War II (WWII), the Battery was used as command post for all harbor defenses. Two pillbox-style observation posts, connected to the main battery by tunnels, date from this period.

At present, the buildings are abandoned. Inside the Battery Dynamite, the preliminary assessment team noted that a rusted above-ground tank with unknown contents was left standing in one of the compartments. (See Sec. 3.7 for additional discussion of above-ground tanks.) Asbestos was reportedly used in the construction of the interconnecting tunnels. The walls of the tunnels, however, did not exhibit much deterioration. ANL investigators were unable to gain access to the inside of the powerhouse. It is now used as a storage area, but the building is dilapidated. An underground storage tank, probably used to store fuel oil, is situated between the powerhouse and the battery very close to a storm sewer. The status of this tank is unknown.

2.2.6 Letterman Army Medical Center (LAMC)[2,3]

The Letterman medical facilities located at PSF date as far back as the Spanish-American War. During WWII, Letterman Army Hospital was the largest debarkation medical center in the United States. The hospital facilities occupied many of the buildings located in the area that was considered the main post (currently identified as the 1000 and 1100 Building Areas) of PSF, and it was the largest and most active operation on-post by the 1950s. In 1969 a new 10-story Letterman General Hospital was built, identified as Bldg. 1100, and in 1973 the facility was renamed Letterman Army Medical Center. The LAMC provides medical care, dental care, environmental health services, and occupational health services to active and retired military personnel and their families. It also maintains limited facilities for veterinary care.

2.2.7 Letterman Army Institute of Research (LAIR)[2,3,11]

In 1966, the U.S. Army Medical Research Unit was organized under U.S. Army Medical Research and Development Command (USAMDC). In 1969 this unit was redesignated as Letterman Army Institute of Research. The LAIR performs general medical research and conducts specialized research in the areas of nutrition, infectious diseases, dermatology, surgery, blood transfusion, laser safety, and experimental psychology. The LAIR also uses available PSF resources and capabilities to support clinical investigation projects recommended by the Commander of Letterman Army Medical Center and performs other medical research activities as directed by the Commander, USAMDC. Responsibility for Department of Defense research in nutrition

continues as an additional mission of the LAIR.[11] The major portion of LAIR research activities is conducted in Bldg. 1110, which was constructed adjacent to the LAMC in July 1976.

Research laboratories at LAIR are supported by analytical chemistry, animal resources, surgical, pathology, radioisotope, and toxicology services. A Hazardous Communication Program has recently been implemented, and a recent inventory of hazardous materials was developed for the LAIR laboratory operations. This inventory can be found in Appendix K.

2.2.8 U.S. Public Health Services Hospital Facilities[2]

The PHSH was operated independently of the PSF until 1981. The hospital complex is located in the southern portion of PSF and occupies 36.5 acres of land in the area of Bldg. 1800. The PHSH has one large building, in which the major hospital and laboratory activities took place, approximately a dozen support buildings, a tennis court, several paved parking lots, and an emergency helipad.

Historically, the PHSH was built in the late 1800s to serve the Marines. Figure 2-4, derived from a circa-1907 map, shows the general site of the original U.S. Marine Hospital and its support buildings. In addition to locating the original buildings, this map shows the existence of a cemetery in the northeast section of the property associated with the hospital. The pumping station that appears in the upper right hand corner of the map was not connected with the Marine Hospital or later with the PHSH. Instead, this pump station was originally used to deliver water from Mountain Lake to the PSF drinking water system. It has been used more recently to supply irrigation water from Mountain Lake to the golf course.

Reportedly, the property occupied by the PHSH was originally part of the PSF and was released for use as a public health facility in 1927.[2,3] A new hospital building was constructed in the 1920s (Bldg. 1801). Major renovations in 1950 added the wings to the main building, which now is 300,000 square feet and seven stories high. The current site plan for the PHSH appears in Fig. 2-5.

A summary of the extant buildings and facilities associated with the PHSH, as to their current and past uses, is presented below. All of these buildings other than Bldg. 1801 are believed to have been constructed in the 1930s.

Building 1801[2]

This is the largest of the buildings and was the main hospital. Building 1801 also had laboratory space that was used for research on preventative medicine and leprosy. After PSF regained control of the property in 1981, this building was stripped of all hospital equipment except for some laboratory equipment on the first and sixth floors. The Clinical Investigations division of LAIR currently uses the sixth floor lab space. The Defense Language Institute (Monterey, Calif.) used other parts of the building as a dorm for students for about four years from 1981 to 1985. Wastes generated by this activity

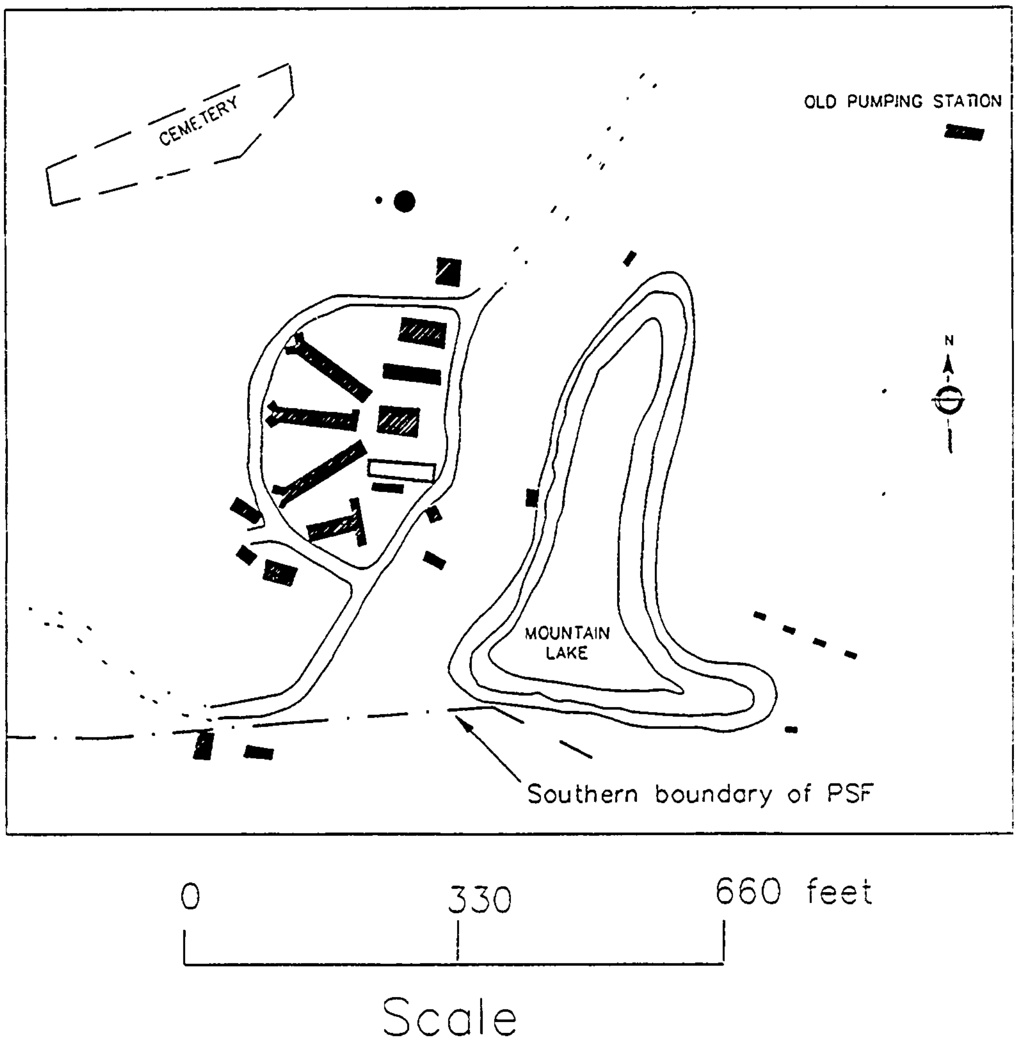


FIGURE 2-4 U.S. Marine Hospital at PSF about 1907

are removed from the PHSH complex by LAMC and incorporated with other LAMC wastes.

Building 1802[2]

This was the engineering shop and boiler room. It operated three boilers that served nearby family housing units as well as the main hospital building. All three boilers are still in place. Substantial deterioration of asbestos boiler and pipe insulation has occurred. Currently, this area of the building is off-limits to unauthorized personnel due to the hazards associated with the deteriorated asbestos; anyone entering the area must wear respiratory protection.

Building 1803[2]

This building is believed to have been a library.

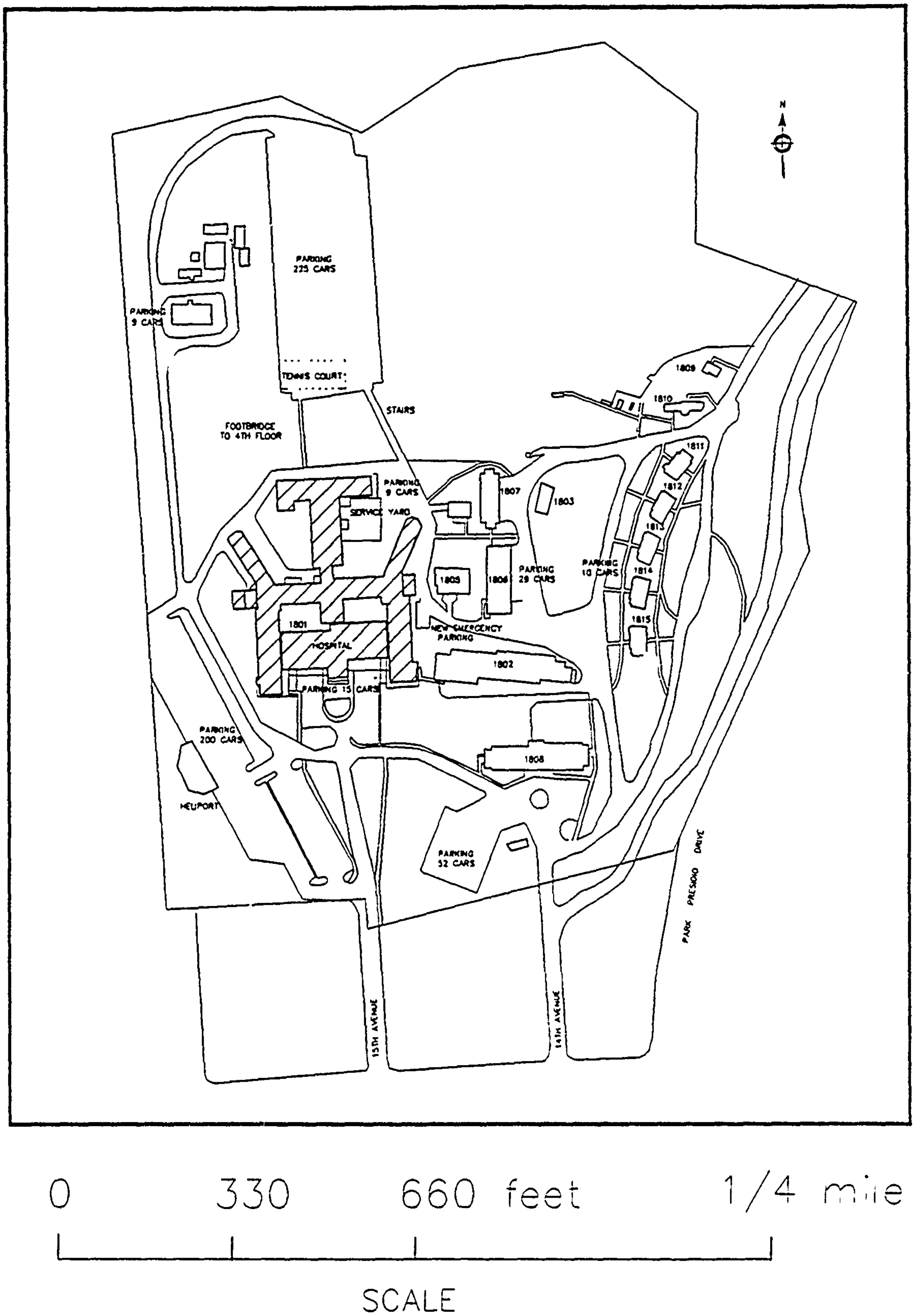


FIGURE 2-5 Current Site Plan, PHSH

Building 1805[2]

This building was used as the auditorium and Officers Club.

Building 1806[2]

This building was used as a bachelor officers' quarters.

Building 1807[2]

Currently this building is empty and has been sealed in order to prevent vandalism. However, it was used as an animal research laboratory for leprosy until it was closed.

Building 1808[2]

Currently, a dental research laboratory associated with the University of California and the HQ Western Sector Military Entrance and Processing Command are occupying this building.

Buildings 1809-1815[2]

These buildings have always been used as housing units and are currently occupied by military personnel.

Building 1817[2]

This building is an old groundskeeping maintenance shed. It is empty, except for accumulated trash, and abandoned.

Building 1818[2]

This building was originally used for plague research and later as an administrative office building. The 548th Explosive Ordnance Disposal (Control) Detachment currently occupies the building.

Incinerator[2]

This incinerator was used for the disposal of the animals used in research and is located behind Bldg. 1818. It is not currently used. (A second, larger-capacity incinerator was constructed at the PHSH, but it never became operational.)

Building 1827[2]

This was the old engineering building and is currently used to store insecticides and other hazardous materials. PSF officials report that pesticides still remaining in this building will soon be removed for proper disposal.

Cemetery[2]

As shown by Fig. 2-4, a cemetery is located at the northwestern tip of this property and is currently about half covered by the paved parking lot and tennis courts (see Fig. 2-5). Reportedly, about 400 to 500 bodies were buried under 10-15 feet of soil in this area. The reasons for the deaths and the identification of the bodies are unknown. It is believed that the last burial occurred in the 1940s. All the bodies reportedly still remain in this area.

PHSH Area Storage Tanks

Eight underground storage tanks (USTs) for fuels are known or suspected to exist at the former PHSH facilities. Information from PSF personnel indicates that there are five USTs currently in use at Bldg. 1800. Since this building is a minor structure, it appears safe to assume that these tanks are instead located within the "1800 Area" (PHSH complex). Four of these tanks are reported to contain diesel fuel, and one is reported to contain unleaded gasoline. A UST at Bldg. 1802 currently holds fuel oil for an emergency power generator. A UST of unknown status reportedly stores oil at Bldg. 1818. PSF personnel report that a UST storing fuel oil possibly exists for the boiler facilities at Bldg. 1801. (See Sec. 3.8 for additional discussion of underground storage tanks.)

2.2.9 Nike Missile Installations/Battery 89L, PSF

Generic information on the Nike Missile program has been compiled by both the Army Corps of Engineers[12] and the U.S. Army Toxic and Hazardous Materials Agency.[13] In both of these studies, independent contractors relied on information contained in unclassified documents related to the Nike missile program including engineering drawings and specifications (for the Nike facilities and the missiles themselves), interviews with Army personnel participating in the Nike program, and operations manuals and directives relating to the operation and maintenance of Nike facilities. While much information about the Nike defense program is available, some remains classified for reasons of national security.

Taken together, these two reports represent the most complete assemblage of information on the Nike missile program from an environmental perspective. Nevertheless, both reports note the paucity of specific information regarding the generation and subsequent disposal of wastes associated with Nike missiles. When they could be found, neither the field manuals, the deactivation plans, nor the operational reports filed by the individual installations addressed waste management to any great

extent. Consequently, although the nature and composition of wastes could be logically inferred, conclusions about their subsequent management and the long- or short-term environmental impacts from Nike batteries are highly speculative and largely undocumented. The degree of inaccuracy resulting from interpolation of operation manuals is, therefore, acknowledged but still undefined. Salient points from both reports are condensed below.

Nike Ajax missiles were first deployed in 1954 at installations throughout the continental United States, replacing, or in some cases, augmenting conventional artillery batteries and providing protection from aerial attack for strategic locations and resources. Typically a number of batteries were placed in rural areas encircling the protected resource or location. The Ajax was a two-staged missile using a solid-fueled booster rocket and a liquid-fueled sustainer motor to deliver high-powered explosives to airborne targets.

Nike Hercules missiles were introduced in 1958 and gradually replaced the Ajax. The Hercules was also a two-staged missile, differing from the Ajax in that its second stage was solid-fueled and its payload was normally a nuclear warhead. Otherwise, the design of the Hercules was such that installations designed for the Ajax could be easily converted to handle Hercules missiles. Much of the ground-support equipment for the two missiles was identical. The Ajax-Hercules conversions took place between 1958 and 1961. An improved version of the Hercules was introduced in 1963 but was deployed at only a few installations.

A third missile, the Zeus, was under development when the Nike program was phased out. The Zeus was never deployed. At its zenith, the Nike program involved over 290 batteries located throughout the continental United States. Phasing out of the entire Nike program was complete by 1976. Some properties were excessed and sold to private concerns or handed over to local communities for nominal fees. Many were turned over to state National Guards.

A typical Nike battery consisted of two distinct and separate operating units, the missile launcher area (MLA) and the integrated fire control (IFC) area. The launcher area was usually 40 to 50 acres in size, while the IFC was typically 10 to 50 acres. The two areas were separated usually by less than two miles with lines of site between them for communication and tracking purposes. When topography permitted, the IFC was normally placed at the higher elevation. A third area containing barracks facilities was also sometimes included in a battery. Alternatively, barracks were incorporated into the IFC area.

The Nike missile installation at PSF, Battery 89L, was constructed in 1955 near what is now the 1400 building area, along Battery Caufield Road. The installation was a launch site for Nike Ajax missiles. This site reportedly had its first test launch of an Ajax missile in 1956. The battery was never converted to Hercules missiles. The area consists of two buildings, 1450 and 1451, and is located on an area of about 10-12 acres. This entire area is surrounded by a six-foot chain link fence with a barbed wire border. Figure 2-6 shows the original buildings and the three original missile silos, with provisions for the future construction of three additional silos. The silo area was built on a lower grade than the buildings and missile-fueling area. Building 1450 was used as the main

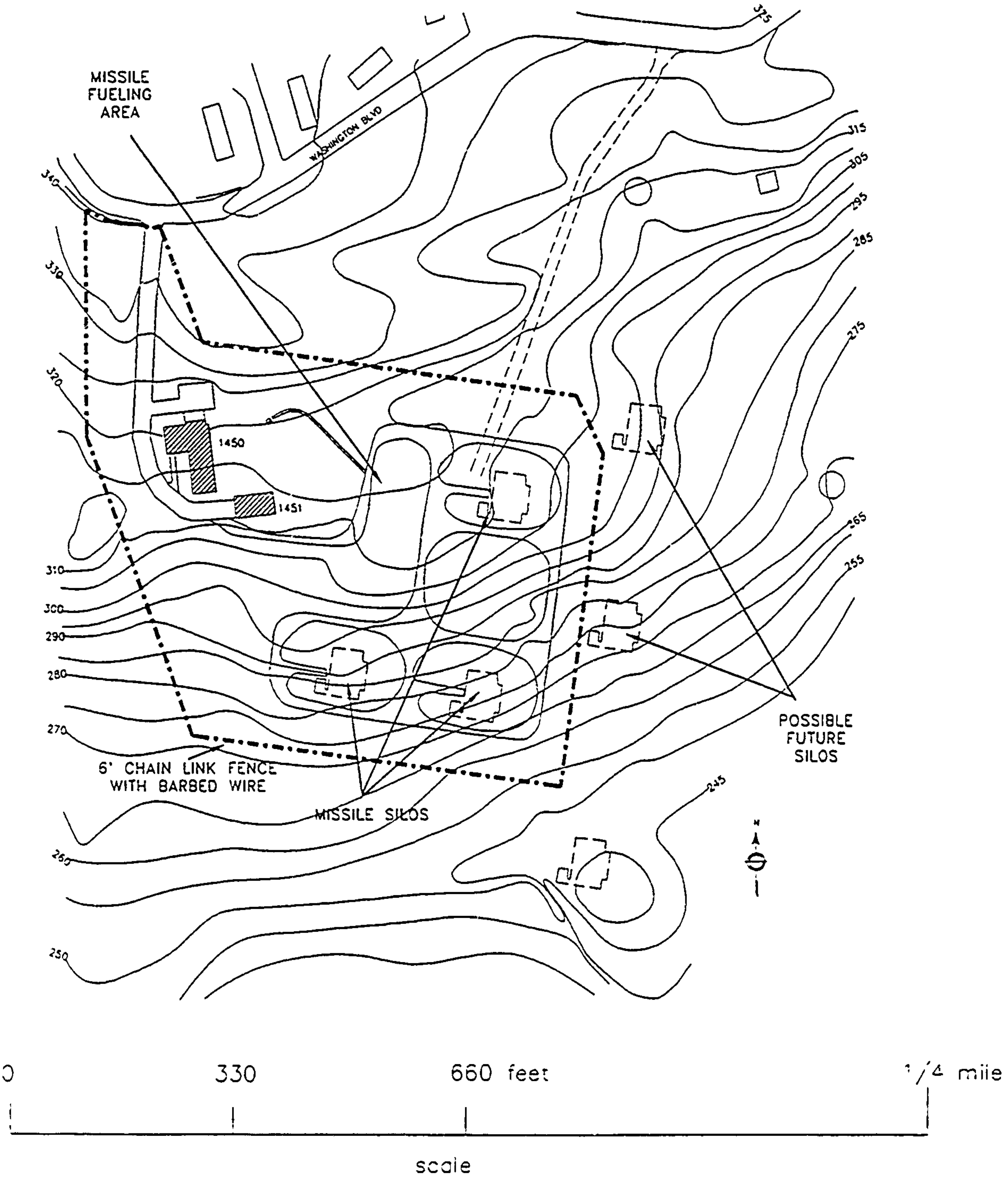


FIGURE 2-6 Site Plan for Former Nike Battery at PSF

area for maintenance and repair of missile components and any administrative work associated with the battery's operation. The smaller Bldg. 1451 served as a maintenance area for support equipment. The actual Ajax Nike operations were believed to have ceased in 1964. Site 89L apparently was scheduled to be converted to function as a Hercules launch site, but the conversion was never completed. There was no formal decommissioning plan for the battery. In addition, no documents pertaining to the battery's closure were found during this investigation.

2.3 PROPERTY HISTORY

The Presidio of San Francisco was formally established as a military garrison on September 17, 1776, by the government of Spain. It was part of a system designed to guard Spain's New World Empire against foreign encroachment,[14] the northernmost of Spain's military garrisons on the Pacific Coast.[10]

2.3.1 Spanish Period

Sebastian Viscaino first described the great port that would be known as San Francisco Bay, in 1602, but it eluded other explorers for many years.[14] Early accounts of the San Francisco peninsula describe a series of low sandhills covered with a sparse growth of shrubs and grasses, an occasional scrub oak, and pockets of laurel trees. Large salt water marshes and swamps dotted the bayshore and fronted the area between what is now the PSF main parade ground and the Letterman Army Medical Center. The few native Americans who inhabited the area lived in small camps of thatched houses along the shores of the marshes and subsisted on shell fish taken from the bay. It appears that these natives fled the area before the arrival of the Spanish settlers, probably because of warfare with neighboring tribes.[10]

A land expedition led by Captain Gaspar de Portola reached San Francisco Bay on Nov. 2, 1769, after which the viceroy of New Spain instructed Captain Rivera y Moncado to establish a presidio there. On March 27, 1776, Lieutenant Colonel Juan Bautista De Anza selected the headland (Fort Point) overlooking what is now the Golden Gate as the natural site for a fort to control the entrance to San Francisco Bay. He erected a cross and buried an account of recent explorations at the foot of the cross. The gently sloping area from the main ridge (Robb Hill and Presidio Hill) north to the bay was selected as the site for the "presidio,"[14] which in Spanish means a defense or protection.

On July 26, 1776, Lieutenant Jose Moraga and a party of 13 soldiers and their families, several families of settlers, their servants, a mule train, and cattle camped at the presidio site. On August 13 a supply ship arrived, and shortly thereafter a plan for the presidio was laid out following the standard Spanish design. A presidio was usually built as an enclosed rectangle with adobe walls 10 to 20 feet high. Buildings were constructed along the walls facing a central plaza about 80 yards square, and these invariably included a commandant's house, church, barracks, storehouse, and guardhouse.[14] This quadrangle was located near the present site of the Officers' Club (Bldg. 50) and near El Polin Spring, which is now at the south end of MacArthur Ave. The original buildings were of mud and reeds, but these were soon replaced with more

permanent adobe structures.[10] Building progressed rapidly, and the ceremonial founding of the Presidio was celebrated on Sept. 17, 1776.[14] In 1794, Castillo de San Joaquin was erected where Fort Point now stands to guard the strait into San Francisco Bay.[10]

After the beginning of the 19th century, Spain's interests and finances were directed to parts of its empire other than Alta California, and the adobe structures of the Presidio, which were periodically ravaged by floods, earthquakes, and storms, fell into disrepair. The Castillo, because of its adobe walls and sand foundation, crumbled from shock every time a salute was fired.[10]

2.3.2 Mexican Period

Mexico gained independence from Spain in 1822 and took control of the Presidio, but Mexico was less interested in the defense of San Francisco Bay than the Spanish had been. The Mexican Army abandoned the Presidio in 1835 and moved its garrisons inland to Sonoma, 35 miles north of San Francisco. This location was closer to the overland routes beginning to bring white settlers into the area.[10]

Mariano Guadalupe Vallejo, commandant of the Sonoma garrisons, repeatedly requested troops for the Presidio but was refused by the Mexican Army. In mid-1838, two earthquakes destroyed what little was left of the buildings. In 1840, Commandant Vallejo sent a sergeant and 12 men to garrison the Presidio. They probably remained until 1843, after which no Mexican troops occupied the Presidio. Between 1841 and 1844, Mexico was so disinterested in Alta California that Vallejo supported the garrisons at Sonoma and the Presidio with his own resources.[14]

On July 9, 1846, Lt. J.S. Misroon, U.S. Navy, and a detachment of marines raised the U.S. flag over both the Presidio and the Castillo, but they left that evening, without having occupied the sites.[14] During this period, American occupation of the Pacific Coast territories received little opposition from either Mexico or from Californians themselves, even though the United States and Mexico were officially at war.

In March 1847, two companies of the New York Volunteers, under Maj. James A. Hardie, were the first Americans to occupy the Presidio as a garrison. They moved into the eroding buildings and, during the summer, they moved supplies and light ordnance from the beach at Yerba Buena (now the North Beach area of San Francisco[15]) over the hills to the Presidio.[14] The volunteers repaired the adobe structures, added shake roofs, and built a picket fence surrounding the buildings.[10] (Yerba Buena was officially named San Francisco in January 1847.[15])

2.3.3 Early United States Occupation

The Mexican War ended with the signing of the Treaty of Guadalupe Hidalgo in 1848.[10] This treaty transferred title to all public lands in the ceded area from the Mexican to the U.S. government. A federal commission appointed in 1848 to select military sites recommended the Presidio boundaries, which were subsequently established by Executive Order of President Millard Fillmore in Nov. 1850.[14] These initial

boundaries included the present post, Fort Mason (now the wharf area east of the Presidio) and much of the western edge of the San Francisco peninsula.[10] California was admitted to statehood on Sept. 9, 1850.

After the discovery of gold at Sutter's Mill in January 1848, it was difficult to keep troops from deserting to go to the gold fields. When the war ended, the Volunteers were mustered out of the service and the Presidio was abandoned by August 15, 1848. The present boundaries of the Presidio were established by President Fillmore on Dec. 15, 1851, after local citizens protested the size of the initial reserve, but troops do not appear to have been garrisoned there until after the excitement of the gold rush had subsided. Any troops that remained during the Gold Rush were deployed away from the Presidio to fight Indians, and the post remained as the Volunteers had left it, with adobe structures being utilized as a laundry, a barracks, and a hospital.[10]

Inspector General Col. J.K.F Mansfield arrived in San Francisco in May 1854. He recommended remodeling of the Presidio as a major priority. During the late 1850s, picket fences and a two-story multipurpose building to house two companies of artillery, stores, and a medical facility were constructed. In January 1857 a separate hospital was completed.[10] This was the first hospital built in San Francisco, the Wright General Hospital with 28 beds. In 1973 this building (after several remodelings) was rededicated as the Presidio Army Museum (Bldg. 2).[14,16] By 1859, only three of the original adobe structures remained, but the new wooden buildings proved to be unsound and they were demolished to make way for construction of a new post in 1862-63.[10]

During the 1850s, improvement of the harbor defenses became a top priority, and a new brick and granite fortress was constructed at Fort Point. The old Castillo San Joaquin was razed, and some of the salvaged stone and brick were used in the foundation for Wright Hospital.[14] The new fort, patterned after Fort Sumter, was under construction from 1854 to 1861.[16]

2.3.4 Civil War Period

During the Civil War, both Southern and Union sympathizers were present in California, and the Presidio became important to the Union as a defense for the Port of San Francisco -- the port providing access to the gold mines and the California and Nevada silver lodes. Major building efforts took place, and, for the first time, the boundaries of the post were extended beyond the original Spanish-Mexican quadrangle. A parade ground was laid out near Bldgs. 38 and 39, and a handsome row of officers' quarters (some of which exist today as Bldgs. 5-16 on Funston Ave.) marked its eastern edge. A row of barracks for enlisted men faced the officers' quarters across the parade ground. (Buildings 86 and 87 survive from the latter group today, but their appearances have been substantially altered.[10]) Other construction during the Civil War period included a powder magazine of stone and concrete block (Bldg. 95), built directly off the western edge of the parade ground, and considerable remodeling of Wright Hospital. The three adobe structures still in use served as a laundry (building demolished before 1900), an officers' quarters (demolished as a result of damage suffered during the 1906 earthquake), and the officers' club (remodeled over the years and presently existing, in a greatly altered state, as the Officers' Open Mess, Bldg. 50).[10]

2.3.5 Indian War Period

When the Civil War ended in 1865, the troops at the Presidio again turned their attention to the Indian "problem." The U.S. Army Department of the Pacific was headquartered at the Presidio, which became the central deployment point for troops engaged in Indian warfare on the West Coast. Troops arriving to participate in the Indian campaigns required new barracks, although only two of a series of proposed new barracks were ever constructed. Only one of these (Bldg. 36, Military Police Headquarters) survives today. Two of the Civil War barracks (Bldgs. 86 and 87) on the west side of the parade ground were converted from one-story to two-story buildings. Several new officers' quarters were built opposite the Civil War cottages on Funston Avenue, and the cottages themselves were altered to face east onto Funston Ave. rather than west onto the parade ground. Funston Avenue itself was landscaped and became the post's main entrance. Other extant structures built during this period are the chapel (Bldg. 45) and the post trader's residence (Bldg. 116). The trader's, or sutler's, store operated as a trading post for the troops before the days of the post exchange.[10]

Several surveys of the Presidio were completed after the Civil War. Deputy Surveyor James T. Stratton conducted a survey during April and May of 1866 under direction of the U.S. Surveyor General of California, but this survey was never approved by the DOI. Confusion regarding the location of the post's eastern boundary occurred, and people inadvertently settled on Presidio land thinking it belonged to the city. An Act of Congress, approved May 9, 1876, relinquished 62.79 acres along the Presidio's eastern boundary to the city and established Lyon Street.[16]

Although the sovereignty of California transferred from Spain to Mexico to the United States, the old Pueblo land grants of the Spanish regime remained unaffected. To determine the exact limits of the land being claimed by San Francisco, a final survey was made under the direction of the U.S. Surveyor General by F. Von Leicht, U.S. Deputy Surveyor, in 1883. This survey was patented on June 20, 1884, and fixed the area of the Presidio Reserve at 1,479.94 acres. Previous to this, several private claims to Presidio land were rejected by the Land Commission or by U.S. Courts.[16]

In 1874, the War Department consented to the occupation of a portion of the Presidio near Mountain Lake by the Department of the Treasury as a site for a Marine Hospital. The land was transferred to the Treasury Department in 1927 by Act of Congress, with a provision stating that the land would revert to the War Department when it ceased to be used as a Marine Hospital. Operation of this facility was transferred to the U.S. Public Health Service at a later date. In 1964, an additional 1.99 acres was added to the site. The land reverted to PSF in November 1981.[3,16]

During the post-Civil War period, Cpt. C.F. Humphrey, the Presidio's quartermaster, designed an ambitious plan for expansion of the post, but only a few buildings, which were altered versions of his original plans, were constructed along Funston Ave.[10] Between 1862 and 1863, about 20 buildings were constructed outside of Fort Point. On Nov. 25, 1882, this area was designated as Fort Winfield Scott and was established as an independent post. Above Fort Point, a series of barbettes (platforms from which guns fire over a parapet) reinforced with brick walls was begun in 1870. These followed the 100-foot contour line above the beach for 0.75 mile and faced generally north and west.[14]

In March 1883, Maj. W.A. Jones of the Army Corps of Engineers submitted a fore... plan for the Presidio to the Pacific Department Commander.[10] His scientific plan for reclaiming the sand dunes and setting up windbreaks included planting trees on the higher elevations, constructing lattices and covering them with fast-growing ivy, and planting coarse grasses and earth-holding shrubs on the open areas of sandy soil. As a result of the original plan, 60,000 trees were planted during the late 1880s,[17] primarily pines, cypress, acacia, and eucalyptus.[10]

In 1884, the Army designated the Presidio burial grounds as a National Military Cemetery. Soldiers formerly buried at battlefields and abandoned posts throughout California and the West were disintered and reburied at this cemetery. Its original size of 9.5 acres was gradually expanded to its existing 28.3 acres.[10]

2.3.6 Spanish-American War Period

The Indian Wars ended in 1890, and military planners began to implement major changes in Army policy. The many small frontier posts appropriate to Indian warfare were abandoned and men and materials were transferred to larger posts located at or near major urban centers where developed transportation systems permitted quicker and more efficient mobilization.[10] One such urban post was the Presidio, which became the headquarters for the Department of California.[14]

During the Spanish-American War, which began in April 1898, the Presidio, which was the primary post on the Pacific Coast, served as the major point of embarkation for troops and supplies bound for the Philippines and other points in the Pacific. It also served as the major training and assembly center for these troops, and thousands of soldiers camped in tent cities on the Presidio grounds during this period. Camp Merriam, named for Presidio commander Brigadier General Henry C. Merriam, was established near the present Lombard Gate.[14] The 1,400 officers and men of the Twentieth Kansas Volunteer Regiment pitched tents on the present site of Letterman Army Medical Center. The Tennessee Volunteers camped in a hollow near Funston Ave.[10] An additional camp, established outside the Presidio grounds, was exposed to wind and fog; its drainage was fouled by drifting sand. These conditions may have been contributing factors to the outbreaks of disease that occurred.

Typhoid and spinal meningitis were rampant, and an epidemic of measles, complicated in many instances by pneumonia, started in the Tennessee and Oregon regiments. Transports soon began returning the sick and wounded from the Philippines by the hundreds, and the post hospital facilities were already exhausted treating the encamped troops. In December 1898, construction of the U.S. Army General Hospital (renamed Letterman General Hospital in 1911) was authorized, and the hospital opened in July 1899. Throughout the war in the Philippines, patients outnumbered the hospital's 389 beds, and it was necessary to use barracks as hospital wards.[14] The entire quadrangle of hospital buildings was completed in 1902, making this the first Army general hospital in the United States. However, most of the complex was demolished in 1975 to make way for medical facilities to support the new hospital opened in 1969. (Building debris from these demolitions is believed to be buried under the old parade ground, which is east of the current parade ground.) Several buildings that were separate

from the main quadrangle still exist, including the administration building (Bldg. 1016), one of the original wards (Bldg. 1007), and a row of officers' quarters (Bldgs. 1000-1004).[10]

A stone boundary wall, visually delineating the post's boundaries, was constructed to enclose the Presidio between 1895 and 1896. Squatters had been a problem from time to time, and the Army no doubt wanted to convey a sense of government presence in the face of the burgeoning population of San Francisco.[10]

After the end of the Indian campaigns in 1890, the Army designated the Presidio for reconstruction in a substantial and permanent fashion. A new, larger parade ground was constructed west of the old parade ground. A number of brick buildings were also constructed, including a row of barracks (Bldgs. 100-106) along the western edge of the new parade ground; a guardhouse (Bldg. 210), built in 1900 and presently housing a bank and post office; offices, warehouses, and shops for the ordnance, commissary, and quartermaster departments just north of the new parade ground along Halleck St. (Bldgs. 222, 223, 225, and 227-229); and a new bachelor officers' quarters (Bldg. 42). Other new brick warehouses and utility buildings, and some new wooden structures, were scattered across the post.[10]

Technical developments in artillery during the latter half of the 19th Century rendered any "modernized" fortifications built at Fort Point obsolete almost as soon as they were constructed. In 1885, Secretary of War William C. Endicott convened a board charged with developing a new program of large-scale fortification for the nation's declining coastal defenses. The board's recommendations were implemented at the Presidio in the mid-1890s with the construction of several reinforced concrete and earthwork batteries. By 1910, a series of interrelated batteries armed with modern breech-loading rifled artillery weapons dotted the Presidio and ringed the harbor entrance. Those batteries presently within the boundaries of the Presidio include the experimental Battery Dynamite (Bldg. 1357), built in 1894-95; and Batteries McKinnen-Stotsenburg, Howe-Wagner, Saffold, Blaney, and Sherwood (Bldgs. 1430, 1287, 1354, 635, and 636, respectively).[10]

2.3.7 Early Twentieth Century

Improvement of utilities was a priority at the Presidio between 1910 and 1920. A new water-purification plant at the mouth of Lobos Creek (present site) was completed in 1911, and water from this plant was subsequently piped to reservoirs constructed throughout the post over the next several years. Included in the reservoir system was the six-million-gallon main reservoir (Bldg. 313) on Presidio Hill, which made adequate fire protection possible for the post. This system replaced a stop-gap reservoir system built earlier (like Bldg. 1469), which took water from wells near Mountain Lake.[10,17] Prior to that, water had been taken directly from Lobos Creek, which became contaminated as the population of the area increased. Electricity was provided to most buildings on the post by 1912.[10]

Because of inadequate fire protection, the wife and three daughters of General John J. Pershing, commander of the eighth brigade, were killed in a fire at their quarters

on the Presidio in 1914. Later, the site of that residence (between the Main Parade Ground and the Officers' Club) was named Pershing Square. The largest flagpole in San Francisco was erected there, and two cannons from the Castillo de San Joaquin were placed near the flagpole.[14]

In the early years of this century, a civilian agency called "The Presidio Golf Club" was established and received permission to establish a golf course on the Presidio. At the beginning, officers were extended privileges of the club house, but in 1913 control was passed to the Army, and civilian members could continue to use the facilities so long as such use did not interfere with the military.[16]

During the earthquake and fire of 1906, San Francisco Mayor Eugene Schmitz charged the Army with responsibility for maintaining order in the crumbling city. Troops from all over the Pacific Division converged on the city to fight the fire. The Presidio became a major relief station during the crisis, providing shelter, food, medical attention, and clothing for many of the 300,000 refugees from the city. A relief camp of 3,000 tents housed 16,000 refugees during the first 10 days after the fire.[14] The installation itself suffered little damage from the quake and none from the fire; the last of the old adobe buildings fell, however, and the original powerhouse for Battery Dynamite was demolished after a retaining wall collapsed.[10] When the city began to rebuild, Army demolition crews cleared the rubble.[14] (It has been reported that some earthquake rubble had been placed along the northern shoreline of PSF, in the area later developed as Crissy Field.)

Beginning in 1908, major development of Fort Scott on the western portion of the Presidio was begun. Its concrete and stucco buildings were constructed in the Mission Revival style, associated with the Spanish heritage of the Presidio. The buildings surrounding the parade ground at Fort Scott form a rare, coherent, and well-preserved complex in that style. Development of Fort Scott continued beyond the end of 1912.[10]

During this time, a number of other areas on the post underwent improvement. Five stables (Bldgs. 661-663 and 667-668) were erected on McDowell Ave. in 1913-14. They were constructed according to a standard military design used at other western posts as early as 1878. During the period between 1890 and 1914 the Presidio served as the staging area for cavalry troops who patrolled Yosemite and Sequoia National Parks. Troop commanders managed those parks for the Department of the Interior as "acting superintendents."[10] The cavalry continued to be important until World War I (WWI), when technological developments made the military use of animal power largely obsolete. The general hospital grew in importance, and its physical plant continued to expand during WWI. In 1911 it was dedicated to Dr. Jonathan Letterman, Chief Surgeon of the Army of the Potomac during the Civil War.[10]

In 1915, the Panama Pacific International Exposition opened in San Francisco. This fair celebrated the opening of the Panama Canal and was a symbol of the reconstruction of the city following the earthquake of 1906. Portions of the exposition were constructed on several acres of reclaimed marshland along the bay shoreline. There is conflicting information as to how this reclamation was accomplished. The popular belief is that muds and sands from San Francisco Bay were dredged and placed in the area that later became Crissy Airfield. It is also reported, however, that this area had

been previously used for disposal of solid wastes and building debris from the 1906 earthquake. When the exposition closed, this land reverted to the Army and eventually became part of Crissy Field. Construction of the exposition required extension of the Belt Line Railroad, San Francisco's waterfront railroad, to the Presidio. This provided the Army with access to rail facilities for future movement of men and supplies.[10]

On January 21, 1888, a portion of the Presidio had been set aside by the Secretary of War for the Treasury Department for use as a Life Saving Service. This site was relocated in 1915 to land originally to be used for the Panama Exposition. This sight is now the Fort Point U.S. Coast-Guard Station.[16]

During WWI, major mobilization efforts took place on the East Coast, causing the West Coast to be drained of regular troops and supplies. National guard units and reserve officers replaced the regulars, and the Presidio became a major training center for officers. The Presidio also served as a demobilization center at the end of the war.[14]

Construction during WWI included a large complex of "temporary" wooden warehouses and shipping stations built in the northeast corner of the Presidio on land reclaimed from the Panama Exposition. Those structures extant today include Bldgs. 1160-1163, 1167, 1169, 1170, and 1182-1188. This area served as the post's major supply depot through WWII.[10] Two hundred and sixteen buildings were built during May and June, 1917, to accommodate the 6,000 men of a new provisional brigade created by Major General Hunter Liggett, the commander of the Department of the West.[14] A few of these structures (Bldgs. 540-542, 546, 548, 550, and 551) still remain in use as officers' family housing. The fire station (Bldg. 218) was also built in 1917, and it was one of the first fire fighting facilities built on an American military post.[10]

2.3.8 From Crissy Field to the Bridge

The Presidio constructed its own air field, Crissy Field, in 1919 on land that originally served as a racetrack and landing field for the Panama Exposition. The Army staged a race to demonstrate transcontinental flight. On Oct. 5, 1919, a team of fliers left the East Coast for San Francisco, and a team left the Presidio for the East Coast -- to determine which team would land at the other's field first. Maj. Dana H. Crissy, commander of Mather Field in Sacramento, was killed when his DeHaviland 4 airplane crashed near Salt Lake City during the race. Crissy Field was dedicated in his honor.[10]

In 1920, the War Department authorized $1 million for improvements at Crissy Airfield, but before construction began the 91st Aero Squadron arrived for temporary duty to observe the coast artillery. The squadron became the regular complement of the airfield and served such missions as forest fire patrols, public relations flights, and aerial photographic assignments.[10]

The buildings erected during the period following WWI are, for the most part, still standing; they form one of the best-preserved complexes of army aviation buildings in the United States. These include two hangers (Bldgs. 936 and 937), gas pump house (Bldg. 929), hose reel house (Bldg. 930), armorer's building (Bldg. 931), aircraft shop (Bldg. 933), motor test building (Bldg. 934), aero storehouse (Bldg. 935), grease rack

(Bldg. 945), signal cable hut (Bldg. 946), bachelor officers' quarters (Bldg. 951, Scott Hall), family housing (Bldgs. 952-964 and 966), enlisted men's barracks and mess hall (Bldg. 650, Stillwell Hall), an administration building for the airfield (Bldg. 651), and a guardhouse (Bldg. 654).[18]

By 1925, a new hanger (Bldg. 643) was completed, and during that year the clay-over-sand runway was lengthened by 1,300 feet. Unfortunately, because of its geographic limitations, the airfield could expand no farther to satisfy either growing needs or technology. High winds off the Pacific and channeled through the Golden Gate created difficult weather conditions as well, and the towers of the newly-constructed Golden Gate Bridge presented an aviation hazard. In 1936, the Army abandoned Crissy Field as a primary aviation facility, and planes and personnel were transferred across the bay to newly built Hamilton Field in Marin County.[10] Crissy Field's usefulness was restored after WWII with the advent of the helicopter and army light aviation activities.[14]

In 1922, the Assistant Secretary of War granted a revocable license to the City of San Francisco for approximately six acres of Presidio land on the southeastern boundary to be used as a public playground. This area, which has since been increased in size, is known as the Julius Kahn Playground.[16]

In 1927, the Palace of Fine Arts, which had originally been part of the Panama Exposition on Presidio grounds, was transferred on a 9.93-acre tract to the City of San Francisco in exchange for a railroad right-of-way between the Presidio and Fort Mason. The temporary building was permanently restored in its original ancient Grecian style, and it is known as the Palace of Fine Arts Historical Park.[16]

During the 1920s and 1930s, the nation minimized its military establishment, and plans for closing or changing the use of the Presidio were raised repeatedly. In 1920, there was a proposal to convert the entire Presidio to an enlarged Letterman Hospital. In 1927, real estate agents were anxious to purchase the post from the government and subdivide the land.[10] Finally in 1930, Congress voted $250,000 to replace some of the older wooden buildings with modern brick duplexes. It was with these funds that Bldg. 50, the Officers' Open Mess, was restored in 1933-34 along the lines of its original Spanish architecture.[14] This project used public workers in the Works Progress Administration (WPA), as did the construction of a theater (Bldg. 99) and a new chapel (Bldg. 130).[10]

The WPA projects gave impetus to an Army program in the late 1930s and early 1940s to restore the Hispanic appearance of the Main Parade Ground. In 1940, the Army erected two large concrete barracks (Bldgs. 38 and 39) on the site of the first parade ground. These buildings reflected a more generally "Mediterranean" phase of Spanish Colonial Revival architecture and strengthened the impression of a stucco and red-tile U.S. Army interpretation of the Spanish Presidio. The officers' quarters constructed on Simmonds Loop in 1940 (Bldgs. 510-539) mark the last major use of these Spanish-derived styles on the post.[10]

The Golden Gate Bridge was under construction from 1933 to 1937, and the presence of this structure brought dramatic changes to the appearance of the Presidio.

Approaches to the bridge divided the post into three sections: Doyle Drive, an elevated approach, ran along the southern edge of Crissy Field; Park-Presidio Blvd. crossed the post from north to south. The Park-Presidio Tunnel was opened to bridge traffic in 1940.[10]

Construction of the bridge not only required use of Presidio land, but four structures had to be moved or demolished. In exchange for this, the Bridge District constructed a number of new buildings on the post, including several fire-control stations for the coastal-defense artillery batteries, a rifle range, a series of maintenance shops, quarters for two general officers, gas stations, a central ammunition magazine (Bldgs. 1470 and 1471), and drainage and sewer systems. Most of these are located in the area of Fort Scott. The Bridge District also erected three small reserve-ammunition magazines (Bldgs. 631-633) at Crissy Field.[10]

Although the Presidio was often identified in military writings as the Presidio of San Francisco, it was not until May 24, 1938, that the site was officially designated (by War Department General Order No. 3) as the Presidio of San Francisco.[16]

2.3.9 World War II

During WWII, the Presidio, which formerly had been open to the public, was placed off-limits; armed sentries were posted at the gates.[14] Early in 1942, a network of barbed wire, machine gun emplacements, and antiaircraft guns was established on the Presidio golf course, Baker Beach, and surrounding areas.[10]

The Presidio's dormant harbor-defense system was reactivated during WWII. Initially, the headquarters for the San Francisco Harbor Defense was located in the Battery Dynamite powerhouse (Bldg. 1398) at Fort Scott, but by the end of the war, a new underground facility served as the seacoast headquarters and control point for the entire bay area. This facility was deactivated shortly after the war ended. A group of subsidiary structures at the Presidio, including reserve magazines, fire-control stations, and a radio relay station provided support services for the new 16-inch coast artillery guns emplaced at Forts Cronkhite and Funston.[10]

In the interest of security, Gen. John L. DeWitt, commander of the newly activated Western Defense Command and Fourth Army, headquartered at the Presidio (in Bldg. 35), recommended the evacuation of all persons of Japanese ancestry from strategic coastal areas. Executive Order 9066, issued by President Franklin D. Roosevelt, empowered the suggested measures, and more than 110,000 persons were evacuated and relocated. During this same period, the Army established a foreign language training school in hanger 643 at Crissy Field to train first generation United States-born children of Japanese immigrants as translators, interpreters, and interrogators for the field forces. This was the first foreign language training school ever established by the Army.[10]

The Presidio served as the command post from which Gen. DeWitt commanded the assault on the Aleutians during the summer of 1943. Late in 1946, after considerable reorganization, the Sixth Army was headquartered at the Presidio.[16]

Letterman General Hospital became the largest debarkation hospital in the nation during WWII, handling a peak of 72,000 patients returning from the Pacific theater of war during a single wartime year. A small barracks group was built on the northern edge of the Main Parade Ground as part of the hospital's wartime expansion. These are still extant; another group of barracks built near what is now the Department of Engineering and Housing complex in the northeast corner of the post was razed in the 1970s. (The disposal location for this demolition waste is unknown.) Other buildings erected during WWII and still extant are a complex of barracks located at the end of the old runway at Crissy Field, the present offices of the Presidio Army Museum (Bldg. 3), and two bachelor officers' quarters (Bldgs. 40-41).[10]

2.3.10 To the Present

After WWII, Army activity at the Presidio declined sharply, and plans for closing the post or converting it to nonmilitary use surfaced again. In 1946, President Harry Truman offered to donate the site to the United Nations should it decide to make San Francisco its permanent home. Despite these proposals, the housing shortage created by thousands of soldiers returning from overseas spurred two building projects in 1947-48. First, many existing buildings were converted into housing, including the Civil War officers' quarters along Funston Ave. Second, Bldgs. 401-425 were constructed as officers' family housing, which required the logging of some of the dense forest created by the plantings of 1883. In 1953, another section of the forest was logged in the southwest corner of the Presidio for the contracted construction of the Wherry Housing complex for rental to the families of enlisted men.[10]

Early in 1946, the War Department replaced the nine service commands in the Zone of Interior with six Continental Army commands. One of the new commands, the Sixth Army, which had fought through 25 major campaigns during WWII, was headquartered at the Presidio.[16] The post serves as Sixth Army headquarters today.

The Korean War once again increased troop strength at the Presidio, and it also increased the number of sick and wounded at Letterman Hospital. Starting in the latter 1950s, surface-to-air Nike missiles replaced the coast artillery of earlier times as the Presidio's chief defense arsenal. The installation served as the headquarters for Nike missile batteries scattered around the San Francisco Bay area.[10]

During the 1960s, Letterman General Hospital continued to grow in size, particularly as U.S. involvement in Southeast Asia escalated. In 1969, the Army erected a 10-story reinforced concrete building east of the existing Letterman complex, and a theater was added to the northwest corner of the Medical Center in 1975.[10] The new building has 550 beds and measures 445,000 square feet. In 1966, the Medical Center and the Western Medical Research Institute, which became known as the Letterman Army Institute of Research in 1969, were joined to form the present Letterman Army Medical Center complex.[16] Building 1110, which currently houses LAIR activities, was constructed north of LAMC in 1976. Several substantial officers' family housing projects also reached completion in the 1960s and 1970s.[10]

In February 1963, the Presidio was designated a Registered National Historic Landmark.[16] During the summer of 1981, an historian and an architectural historian undertook an architectural and historical inventory of the Presidio under the joint sponsorship of the NPS and the Army. All structures were surveyed, and a detailed inventory was prepared, identifying those with the greatest historical significance -- about 400. All structures were then classified into one of five historic-preservation categories according to the overall contribution they make as an historic resource of the United States. In September 1981, the NPS, acting as agent for the Army, awarded a contract to provide a maintenance plan for more than 235 of the historic buildings within the Presidio Landmark District.[10] The survey assisted in the development of this maintenance plan.

In 1965, the Presidio of San Francisco Historic Trail was officially opened. This seven-mile trail covers 27 points of historic interest, and Boy Scouts may complete part of the requirements for the Historic Trails Badge by hiking it. The trail includes the Special Services Recreation Area (Robb Hill), which is used as a picnic area and overnight camping area for the scouts.[15]

Old Fort Point, the only brick fort of its type west of the Mississippi River, was made a National Historic Site in October 1970.[14] The NPS took charge of the Fort in 1971, when the GGNRA was created. Included in the terms of the agreement creating the GGNRA, which includes all of the Presidio, was the stipulation that any land deemed surplus by the Army would be turned over to the NPS for management. The post established the Presidio Army Museum in 1974.[10]

In April 1975, the Presidio provided the space and manpower, combined with help from many local organizations and individuals, to receive and temporarily care for approximately 1,400 war orphans evacuated from Vietnam.[19]

Between 1970 and 1982, existing services on the Presidio were up-dated and centralized by the Army. A new gymnasium (Bldg. 63), commissary (Bldg. 252), and post exchange (Bldg. 605) were constructed. However, several historic structures were judged surplus or outmoded and destroyed. These included the last remaining building on the post from the 1915 Panama Exposition and much of the original Letterman Hospital complex.[10]

2.4 ENVIRONMENTAL SETTING AND SURROUNDING LAND USE

2.4.1 Demographic Factors and Land Use

The PSF is located in the City of San Francisco, in San Francisco County, the northernmost county on the San Francisco Peninsula. In 1980, the population of the city was 678,974, representing a decrease of 5% from the 1970 population of 715,674.[20] Population projections to the year 2000 forecast a continued decline in the number of city residents.[21] This decline, which has been occurring since 1950, is due both to migration to the suburbs and to the city's confined area, which has not been changed in more than 100 years.[22]

Older urban centers such as San Francisco have higher concentrations of persons 55 and older, in contrast to the younger populations in the suburban areas. From 1974 to 1979, school enrollment in San Francisco declined 20%.[21] In 1970, 28.6% of the population of San Francisco was nonwhite, with blacks, Orientals, Filipinos, Samoans and American Indians being the major groups represented.[22,23]

The PSF housed more than 4,000 dependents on-post as of 1986.[4] Children in grades one through twelve attend school off-post. A nursery, pre-school, and kindergarten are operated on-post.[21] Retired military personnel and their dependents use the Letterman Army Medical Center facilities and other PSF facilities (e.g., commissary, officers' club, main exchange), although they live off-post.[4]

The PSF is situated on the northern tip of the San Francisco Peninsula at the south end of the Golden Gate Bridge. The installation consists of approximately 1,800 acres of land, including approximately 357 submerged or tideland acres (land between high water mark and a line 300 yards beyond the low water mark) and approximately 145 acres deeded to the GGNRA.[4,14,16,21] The PSF is bounded by San Francisco Bay on the north and by the Pacific Ocean on the west. The Pacific side, the 100-acre Baker Beach area,[4] is part of the GGNRA and irrevocably deeded to the DOI. The northern portion of the post consists of Fort Point Historic Site (DOI), the base of the Golden Gate Bridge, and toll plaza complex. The Fort Point Coast Guard Station is immediately east of this on the coast, and the remaining 45 acres[4] of the northern beach area are also deeded to the GGNRA (DOI). The City of San Francisco operates the six-acre Julius Kahn Public Playground just within the southeastern boundary of the Presidio.[16]

The PSF is divided into three sections by U.S. Highway 101, which runs mainly east and west to the Golden Gate Bridge, and by Park Presidio Blvd. (State Highway 1), which runs north and south and merges with Highway 101 as 101 starts angling north to the bridge. Both of these are elevated highways, which may be accessed from the site at Doyle Drive and the Golden Gate Bridge Toll Plaza. The area of the PSF north of Highway 101 is occupied primarily by WWII-vintage structures, a helipad at Crissy Field, and family housing. West of Highway 1 and south of Highway 101 are inactive coast-artillery batteries along the Pacific shore, housing units, and the PSF central magazine. East of Highway 1 and south of Highway 101 is the most highly developed and historically significant area of the post, including Letterman Army Medical Center and Letterman Army Institute of Research, family housing, recreation facilities, and the golf course.[21]

South of the site is the densely populated Richmond District of San Francisco. To the east is the Marina District of the city, also densely populated; during the 1989 earthquake in northern California, the severe earthquake and fire damage in the Marina District was dramatically captured on television while events were occurring. The Palace of Fine Arts also lies east of the installation. Lyon St. forms most of the eastern boundary of the site. The main entrance to the PSF is off Lyon at Lombard St. Other entrances are at Lincoln Blvd., 15th Ave., Arguello Blvd., and Presidio Blvd. on the south; Lombard St. (Main Gate), Gorgas Ave., and Doyle Drive on the east; and the Golden Gate Bridge Toll Plaza. The main business section of the City of San Francisco is about two miles southeast of the PSF.[2]

2.4.2 Climate

Because of its proximity to the Pacific Ocean and San Francisco Bay, PSF has a temperate, Mediterranean climate.[4] Generally, winter is rainy and mild, spring is sunny and mild, summer is foggy and cool, and fall is sunny and warm.[23]

Fog and wind are dominant characteristics of the PSF climate. The fog, caused by warm, moist ocean air coming in contact with cold water welling up from the ocean bottom along the coast, lasts until midday[23] and is most frequent during mid-July to mid-August. Because of PSF's exposed location, fog affects the entire site uniformly.[4]

Winds are primarily westerly to northwesterly. Because they blow off the ocean, the ambient air quality at the PSF ranks among the best in the San Francisco Bay region.[21] Occasional gale-force winds occur, but these are associated with major Pacific storms and are of short duration.[4]

The topography of the PSF shelters most of the north shore from the cool marine air characteristic of western beaches. Mean maximum temperatures exceed 70°F from June through October, and the yearly average maximum of 66°F is four degrees warmer than that of downtown San Francisco. Daytime temperatures are considerably cooler in those areas of the PSF west of the highlands, such as Baker Beach. Mean minimum temperatures range from 45°F in January to 58°F in October.[4] Sunshine occurs during two-thirds of the possible daylight hours.[23]

The entire San Francisco peninsula experiences distinct seasonal variations in rainfall. November through April is the rainy season, with an average rainfall of 19.44 inches. The average rainfall during the remainder of the year is 1.86 inches. Total average annual rainfall is 21.30 inches.[4]

2.4.3 Surface Water

The only unlined impoundment on the PSF is Mountain Lake, located near the southern boundary (see Fig. 2-2). It comprises almost 4 acres and extends to a maximum depth of 15 feet (4.6 m). El Polin Spring, located in the southeastern quadrant, formerly produced flowing water but has been dry for a very long time and is considered inactive.[24] (See Sec. 5.11 regarding the current status of El Polin Spring.)

The only significant natural stream on PSF is Lobos Creek, which flows along the southern boundary and discharges into the Pacific Ocean. Despite its short length, about 1-1/3 miles (2.1 km), Lobos Creek is perennial in its flow; its discharge is also uniform, averaging 1.9 million gallons per day (mgd), or 7,192 cubic meters per day. No storm or sanitary sewers discharge to the creek. The water supply in Lobos Creek comes entirely from groundwater seepage except for periods during and immediately following rainfall runoff events. Seepage is consistent because the Lobos Creek watershed is large compared to the size of the stream.[24]

Water from Lobos Creek is mixed with water from city water supplies and water from wells adjacent to Lobos Creek to supply potable water for PSF. Normally, Lobos

Creek provides approximately 70% of the total potable water supply for the base. (One hundred percent of Lobos Creek flow is diverted to the PSF water-purification plant.) As part of Geohydrologic Consultation #24-0119-78, water supplies from Lobos Creek and from the potable water wells on PSF were sampled in the late 1970s.[24] The Army Environmental Hygiene Agency (AEHA) tabulated the results of these water analyses, which are given in Table 2-3. Wells #6 and #13 are the only two wells currently operating. The locations of the groundwater wells are shown in Fig. 2-7.

2.4.4 Groundwater

There are no published studies on the groundwater system in the vicinity of the PSF except one 1918 report by the USGS.[3] However, the USGS is currently preparing a study of the hydrology of the San Francisco area, and this document should be available within the next few years.[25] The 1918 report states that the various bedrock units at PSF do not represent aquifers because of their low permeabilities. The only significant aquifer is that contained within the Dune sand formation. This aquifer is unconfined and contains a continuous water table, which subparallels land surface topography. No information is available to predict the rate of groundwater movement within the aquifer. The USGS study shows that, although groundwater discharges into Lobos Creek along the southern boundary of the Presidio, the path of bulk groundwater movement is not coincident with Lobos Creek west of Lincoln Blvd. There, the majority of groundwater does not flow beneath the Lobos Creek channel but rather to the east of it, within a depression containing Dune sand. Therefore, most groundwater not intercepted by Lobos Creek or withdrawal wells will discharge to the Pacific Ocean at a point along Baker Beach, which is north of the Lobos Creek discharge.[24]

There are no data available to indicate whether salt water intrusion is a problem in the beach sand units and artificial fill areas along shoreline associated with the Presidio. Salt water intrusion normally occurs because of excessive pumping of fresh water in an area. This does not appear to have been the history at Presidio. In addition, given the distance of the Dune sand aquifer from the fill and beach sand areas, it is not anticipated to have affected the one known aquifer.

Tidal effects near the ocean on groundwater aquifers are normally diurnal. For confined aquifers (none described at PSF), tidal effects would produce fluctuations in the hydraulic head at depth. For unconfined aquifers (e.g., Dune sand aquifers), tidal effects would produce fluctuations in water-table elevations near the surface. There are no data for the Presidio that allow statements to be made regarding the quantitative effects of tides on the known aquifer.

Flow of groundwater normally parallels topography. However, there have been no studies to confirm that this is the case at the Presidio.

2.4.5 Topography

The PSF terrain displays highly variable topography. The northern border along San Francisco Bay is a low flat area developed on fill material. Except for the Baker

TABLE 2-3 Results of Water Analyses for Lobos Creek and Adjacent Wells

Sample Point	pH (units)	Dissolved Solids (mg/L)	Specific Conductance (µmhos/cm)	Hardness (mg/L as $CaCO_3$)	Chloride (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Nitrate Nitrogen (mg/L)	
							AEHA Results[a]	Ft. Baker Results[b]
Lobos Creek No. 1 (upstream)	6.9	393	660	258	49	<0.1	5.2	3.6
Lobos Creek No. 2 (downstream)	6.7	392	640	244	46	<0.1	7.4	2.0
Well No. 1	7.4	350	565	221	31	<0.1	11.0	9.9
Well No. 2	6.8	323	510	195	36	<0.1	4.2	2.4
Well No. 3	7.3	310	515	196	28	<0.1	9.0	7.4
Well No. 4	6.9	319	515	193	33	<0.1	8.8	13.0
Well No. 6	6.9	333	510	191	38	<0.1	6.1	2.6
Well No. 13	7.3	380	580	214	56	<0.1	7.9	6.6
Irrigation Well (Bldg. 316)	6.9	645	1,020	359	127	<0.1	4.2	6.3

[a]Army Environmental Hygiene Agency.

[b]Fort Baker Food Processing Laboratory.

Source: Ref. 24; Geohydrologic Consultation No. 24-0119-78, Presidio of San Francisco, Calif. (June 26-30, 1978).

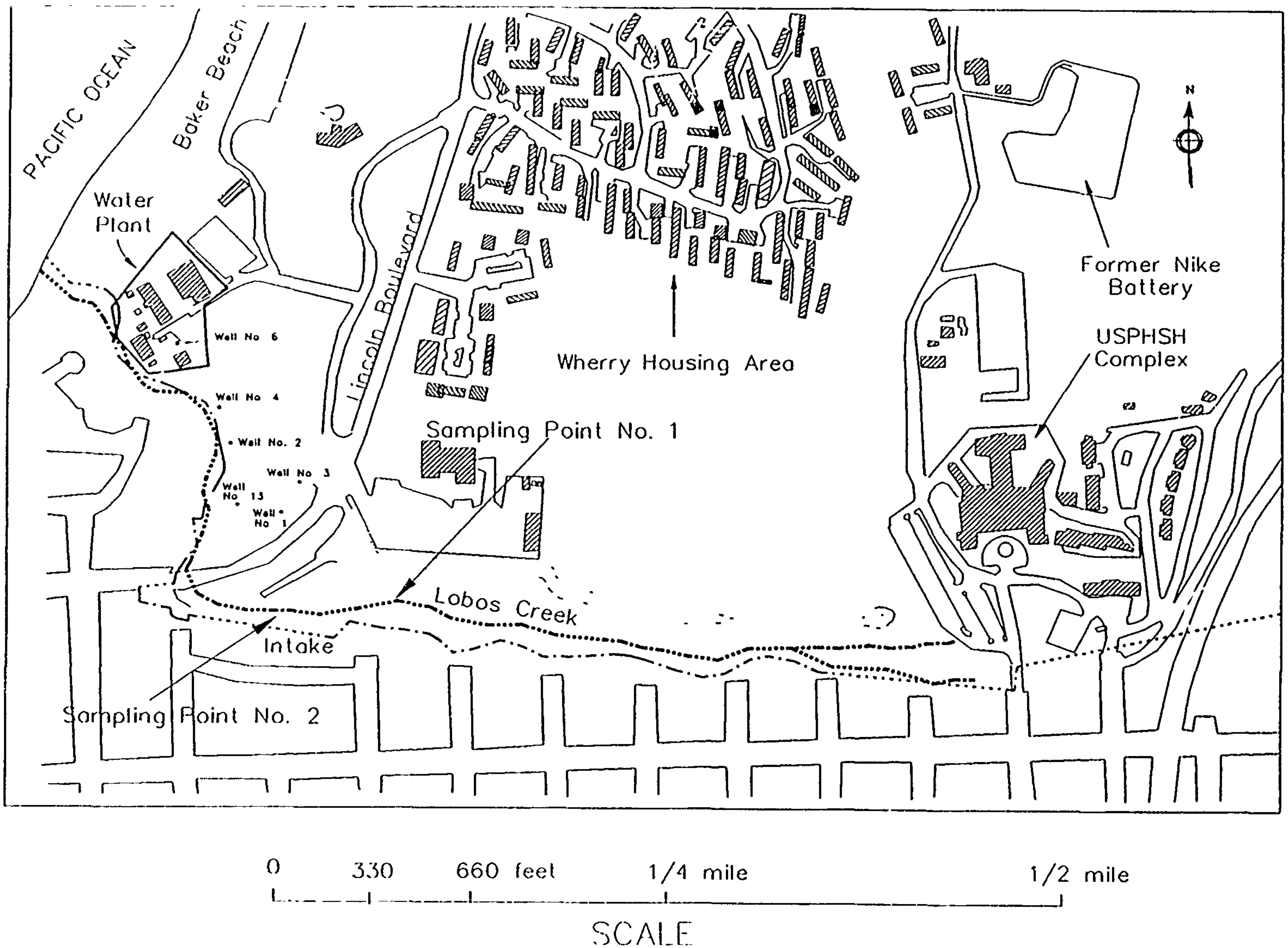


FIGURE 2-7 Locations of Potable Water Wells and Lobos Creek, PSF

Beach area, the fringe of land bordering the Pacific Ocean is very steep (with slopes averaging 50%) and susceptible to landslides. The rest of the installation contains gently rolling to hilly topography. Areas such as the golf course, National Cemetery, and the Wherry housing area contain slopes averaging about 20%. Most of the built-up area, however, exists on land with slopes averaging about 5%. Elevations range from sea level to about 400 feet (122 meters [m]) above mean sea level on Presidio Hill, at the northern edge of the golf course.[24] See Fig. 2-2 for topographic contours.

2.4.6 Structure

The largest conspicuous structural features in and bordering the San Francisco area are northwest-trending faults and shear zones.[26] There is one relatively short, probable fault within PSF which extends southeastward from just north of Baker Beach. One northwest-southeast shear zone, 1.3 mile (2 km) wide, cuts diagonally across most of the installation. Since both the fault and shear zone are not known to cut rocks younger than the Cretaceous age, they are considered inactive. There is always the possibility that they might be reactivated by future activity, but this is considered unlikely because the very large 1906 earthquake (Richter magnitude 8.3) did not reactivate either of them.[24]

The center of PSF is only about 7 miles (11 km) northeast of the San Andreas Fault, one of the most persistent structural features in California and the one whose movement caused the 1989 earthquake. Movement along that fault system can be expected to continue indefinitely and to produce earthquakes of varying magnitudes, with probably one of magnitude 7 to 8+ every 100 to 1000 years. Therefore, PSF is in an area having strong to very strong potential for earthquakes and related hazards-landslides, tsunami damage, liquefaction, and subsidence due to the proximity of the San Andreas Fault.[24]

2.4.7 Soils

No published studies or surveys exist showing the distribution, description, or engineering properties of surface soils at PSF. The probable reason for the absence of such studies is that the surface soils are extremely thin and have not developed any distinct horizons. Where any native topsoil does exist, it consists of about 1 inch (2.5 centimeters) of loamy sand with detrital organic matter. There is little erosion potential, primarily because the soil is highly permeable and because slopes generally contain abundant stabilizing vegetation.[24]

2.4.8 Geologic Units

The geologic units and rock types found on PSF are shown in Fig. 2-8, and the engineering and hydrologic properties of the units are summarized in Table 2-4. Bedrock in the area is composed primarily of Jurassic to Cretaceous members of the Franciscan formation. The Franciscan formation is a complex assemblage of various rock types, predominantly sedimentary, but also volcanic and metamorphic. Along the steep Pacific

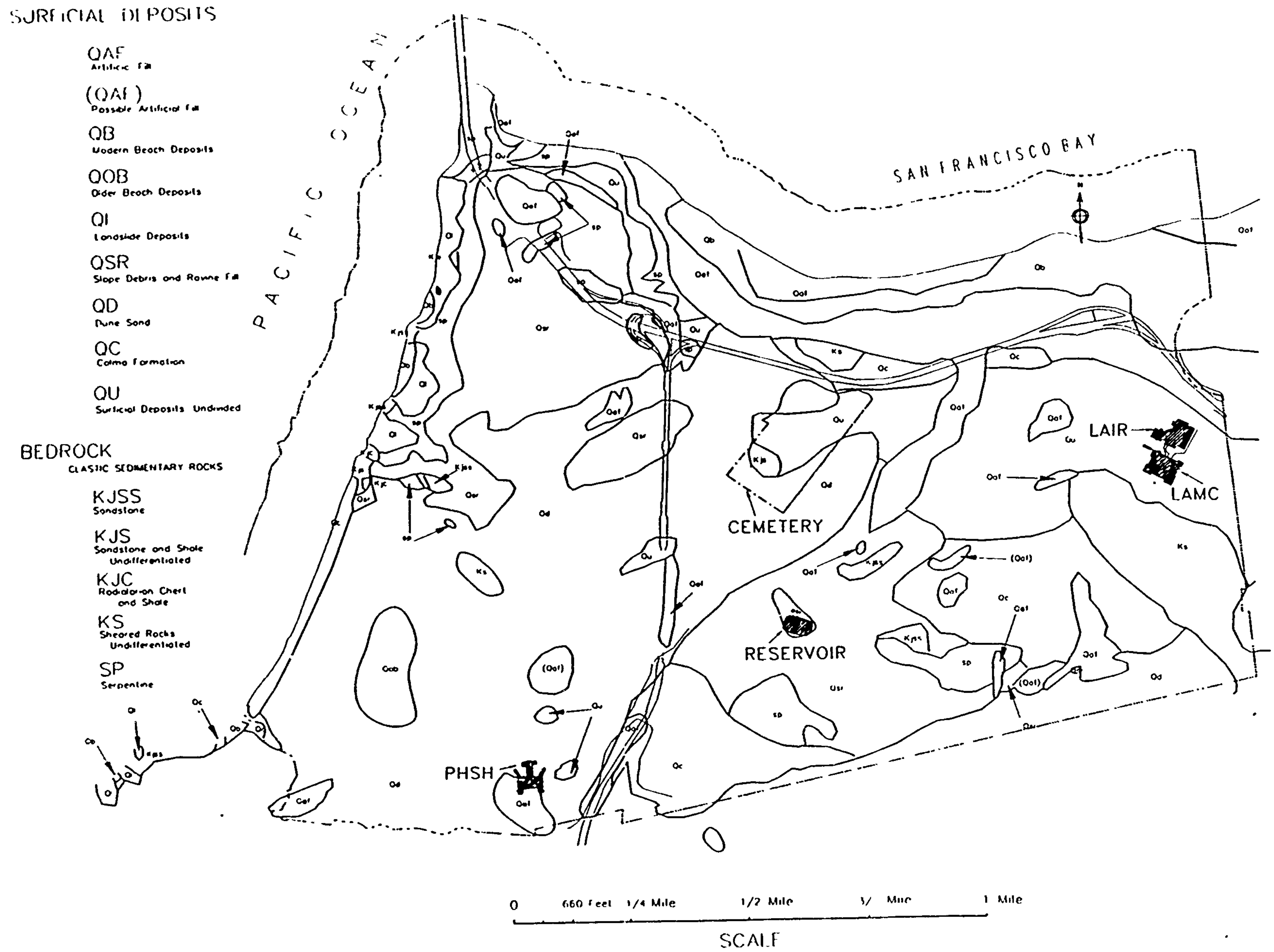


FIGURE 2-8 Geologic Units at PSF

TABLE 2-4 Geologic Units in Presidio Area

	Engineering or Hydrologic Property							
Geologic Unit (and Map Symbol, Fig. 2-7)	Lithology	Weathering, Soil Development Alteration	Permeability	Workability	Slope Stability	Earthquake Stability	Shearing Strength: Foundation Stability	Possible or Reported Use
Artificial	Mostly dune sand but includes silt, clay, rock waste, manmade debris, and organic waste	None	Hign, except where clayey materials predominate	Generally easy to remove except locally in tangles of ship timbers and other manmade debris	Generally low because most fills are uncemented and lie near or below the water table	Poor to fair; most movement where thick, poorly compacted, and overlying soft bay mud and clay; fair where thin, well compacted, and overlying firm materials	Generally *moderate* shearing strength, but exceedingly variable depending on composition, method of placement, age, thickness, underlying material, and history following placement, such as groundwater conditions, loading, and so forth; in 1906 earthquake the greatest damage to structure was inflicted in areas of artificial fill overlying bay mud clay along east shore of city	Used *extensively* for construction material and foundation purposes
Landslide deposits (Ql)	Variable; rock pieces of all sizes in sand, silt, and clay matrix	None or very little	Variable, but generally high	Variable, but generally easy to excavate and compact	Slopes cut in landfill deposits generally unstable; although some undisturbed natural slopes of landslide deposits are stable for many years, sliding may be reactivated by changes in stress or strength conditions	Low	Generally unsuitable for foundations	Rockfalls possible local source of previous fill, rip-rap, and so forth

TABLE 2-4 (Cont'd)

Geologic Unit (and Map Symbol, Fig. 2-7)	Engineering or Hydrologic Property: Lithology	Weathering, Soil Development Alteration	Permeability	Workability	Slope Stability	Earthquake Stability	Shearing Strength: Foundation Stability	Possible or Reported Use
Modern and older beach deposits (Qb, Qob)	Gray, well-sorted, medium to coarse sand; a few small gravel beaches	None	High	Easily excavated with hand or power equipment; compacts rapidly; compaction density increased by water flooding and vibration; owing to high water table, deep excavations require pumping	Generally unstable and free running, especially on slopes greater than about 30°; susceptible to wind and rain erosion; excavation walls more than 2 or 3 ft in height require support	Probably moderate	Moderate to high shearing strength where confined; susceptible to wave erosion on beach; uniform sands have lower shearing strength then well-graded sands	Blending sand for concrete aggregate; fill
Slope debris and ravine fill (Qsr)	Light-yellow to reddish-brown unsorted rock fragments, gravel, sand, silt, and clay in various proportions; clayey parts exhibit moderate swelling and plasticity when wet	Generally none, but a slight weathering of top 2-4 ft seen in older material on Marin Peninsula	Variable, but generally moderate to low	Generally easily excavated and compacted with power equipment	Stands in steep to vertical cuts for several months when dry; generally unstable and prone to sliding when wet; gullying severe	Moderate	Variable; deposits with relatively high clay content are weak and plastic when wet; sandy and gravelly deposits have moderate to high strength	Fill
Dune sand (Qd)	Yellowish-brown to light-gray, well-sorted, fine to medium sand; quartz, feldspar and hornblende are chief minerals	Slight to none; most grains coated with film of iron oxide; minor amounts of carbonaceous plant matter disseminated locally in top 2-3 ft	High; in most places zone of saturation is deep	Easily excavated; compacts rapidly; compaction density increased by water flooding and vibration	Generally unstable and free running; slopes steeper than 30° generally unstable; susceptible to wind and rain erosion; lagging required to support excavation walls more than 2 or 3 ft high	Probably moderate	Moderate to high shearing strength when confined	Fair quality fill; admixed with clay to make foundry sand; small tonnages used as blending sand in concrete aggregate

TABLE 2-4 (Cont'd)

Geologic Unit (and Map Symbol, Fig. 2-7)	Engineering or Hydrologic Property: Lithology	Weathering, Soil Development Alteration	Permeability	Workability	Slope Stability	Earthquake Stability	Shearing Strength: Foundation Stability	Possible or Reported Use
Colma formation (Qc)	Light-brown to orange, fine to medium sand with minor amounts of clay. Evenly spaced horizontal or nearly horizontal bedding and crossbedding; beds 1-3 inch thick Cobble-size rubble beds rare; Low swelling and plasticity when wetted	Moderate to slight soil development; in places soil identified only by presence of organic matter; increase in silt and clay content, and iron staining	Variable from low to high in adjacent beds; found above and below water table	Easily excavated by hand or power equipment; scraper with light ripping or no ripping used on large grading jobs; easily compacted	Fair to good, except for silt- and clay-free layers, which are unstable in cut slopes greater than 30°; excavated vertical faces stand for several months when dry	Probably moderate to high	Moderate to high shearing strength; used for pile and caisson support	Good quality fill
Serpentine (sp)	Mostly soft, friable, sheared rock enclosing hard spheroidal knobs of unsheared serpentine; various colors but generally greenish-gray, blue, or brown	Soil generally absent or less than 1 ft thick; locally 5-10 ft thick mantle of dark-gray clayey material containing much high-swelling montmorillonite; probably derived from sheared and hydrothermally altered serpentine; this material is "adobelike" and develops deep shrinkage cracks on drying	Low to moderate	Sheared serpentine excavated readily with power equipment; massive serpentine may require heavy ripping, blasting, or equivalent; mixtures of massive and shared serpentine excavated with light to moderate ripping	Cut slopes in shared serpentine should not exceed 1:1, and embankment height should be limited; serpentine at and near other bedrock types generally sheared and altered, and slope stability low; nodules of hard serpentine tend to fall our of sheared matrix	High	Shearing strength high in massive rock but decreases with increasing proportion of shearing and alteration; thoroughly sheared and altered serpentine has low shearing strength; veins of soft altered material in hard serpentine may present special problems	Massive and moderately sheared serpentine widely used for fill; highly sheared and altered rock is unsuitable

TABLE 2-4 (Cont'd)

Geologic Unit (and Map Symbol, Fig. 2-7)	Engineering or Hydrologic Property: Lithology	Weathering, Soil Development Alteration	Permeability	Workability	Slope Stability	Earthquake Stability	Shearing Strength: Foundation Stability	Possible or Reported Use
Sandstone (KJss)	Gray, tough, non-porous, fine- to coarse-grained, thick-bedded sandstone and minor thin-bedded shale; conglomerate beds rare; pervasive nearly random fracturing to 1/2-2 inch blocks, but locally, blocks between major fractures are 1 ft or more in size	Maximum depths of weathering observed 60 ft, average 30 ft; soils well developed locally, with 1-18 ft-thick B horizons of sandy clay; A & B horizons high in swelling clay minerals montmorillonite and vermiculite but sand content keeps swelling low to moderate; partly altered rock, C horizon, is brown or orange, friable, and nonswelling	Generally low; moderate to high in fractured rock	Altered rock excavated readily by ripping; backhoe trenching is generally slow; highly altered rock trenched rapidly by backhoe; fresh to moderately fresh rock generally excavated by heavy ripping; massive rock usually requires blasting	Fresh or moderately fresh rock stable in vertical cuts; blocks may fall from vertical faces in joined sandstones; moderately sheared and fractured sandstone stable in cut slopes of 55°. Badly altered sheared, fractured sandstone tend to slump and slide, especially when wet	High	Shearing strength is high except in badly shattered and altered rock	Fresh rock suitable for good quality fill, road metal, rip-rap, concrete aggregate; moderately altered rock suitable for fill; highly altered rock has been used for impervious lining of reservoir
Radiolarian Chert and Shale (KJc)	Reddish-brown alternate beds of hard chert, 1-5 inch thick, and brittle friable shale as much as 1/2 inch thick; inches thick irregular masses of unstratified chert with brecciated structure. Some altered chert is badly fractured and splintery	Slight; cherts whiten from removal of iron and become more broken along joints; shale more broken than chert; hydrothermal alteration to orange and white, but durable rock pronounced in some places, especially in fault zones, to white plastic clay of little or low swell when wetted	Low, except where fractured	Bedded chert generally excavated by moderate ripping; massive chert may require blasting	Generally stable in steep custs, except for minor raveling; sheared and hydrothermally altered zones may slide in steep cuts; dip slopes should be cut at lower angle than dip in beds; commonly chert lies on badly altered greenstone and may slide on slip surface developed in greenstone	High	Generally moderate to high shearing strength except where badly altered	Widely and successfully used as fill and road metal. Suitability of chert for concrete aggregate questionable

TABLE 2-4 (Cont'd)

Geologic Unit (and Map Symbol, Fig. 2-7)	Engineering or Hydrologic Property: Lithology	Weathering, Soil Development Alteration	Permeability	Workability	Slope Stability	Earthquake Stability	Shearing Strength: Foundation Stability	Possible or Reported Use
Greenstone (KJg)	Greenish-gray, asphanitic to medium-grained volcanic rocks; predominantly basalt flows, agglomerates, and tuffs; pillow lavas, locally interbedded with radiolarian chert, are common; most actual exposures are reddish-brown, soft, crumbly, altered rock; hard, tough, unaltered rock limited to deep excavation; some rock altered to soft clay that swells when wet	Maximum depth of weathering observed; 40 ft; soil well developed and reddish brown or grayish-orange in color, containing iron-rich, swelling clay, though swelling and plasticity low to moderate when wetted; hydrothermal alteration common to clayey material containing balloysite and of low to moderate swelling and plasticity when wetted	Low except where fractured	Altered greenstone can be excavated by light to moderate ripping; fresh massive greenstone requires heavy ripping or blasting	Fresh and moderately fresh rock stable in steep cuts, but lava pillows may fall out of weak matrix; altered rock stable at 1:1 or gentler slopes depending on degree of alteration and fracturing and such local conditions as groundwater and height of slope	High	Shearing strength high in relatively fresh rock, low in altered clay rich rock	Moderately altered greenstone with associated chert and shale known locally as "red-rock" is used as fill and road metal; fills of badly altered greenstone are prone to sliding on moderate or steep slopes; relatively fresh rock is possible source of concrete aggregate and riprap
Sheared rocks, undifferenciated (Ks)	Hard rocks of the Franciscan Formation, as much as hundred of feet in diameter, in a soft and crumbly matrix of sheared shale and serpentine	Moderate to well-developed soil; hydrothermal alteration common; swelling and plasticity on wetting is moderate to high in shale and serpentine matrix as well as in soils and hydrothermally altered materials	Low	Soft material easily excavated by light to moderate ripping; large, hard inclusions generally require heavy ripping or blasting	Generally low, especially when wet (matrix); stable in steep cuts where hard rock inclusions are large enough	Moderate	Matrix has low to moderate shearing strength; large rock fragments found in exploratory borings may give false impression of sound foundation conditions	Used extensively for low quality fill; hard rock inclusions used for good quality fill and large riprap

Source: Ref. 26.

Ocean cliffs, most of the bedrock consists of clastic sedimentary rocks, radiolarian chert and shale, greenstone (basalt), and serpentine. Outcrops throughout the rest of the installation primarily consist of serpentine intrusives and coherent blocks of hard rock in a matrix of intensely sheared shale and serpentine. All of the bedrock units are low in permeability.[24,26]

Surficial deposits at the PSF are as variable as the bedrock geology. The Colma Formation is commonly found in the southern and southeastern part of the Presidio (Fig. 2-8). The Colma Formation consists of variably permeable, unconsolidated sand -- fine to medium in coarseness, light brown to gray in color -- and small to moderate amounts of silt and clay. The observed thickness of the unit is 75 feet, with probable maximum thicknesses of 300 feet.[26]

Dune sands comprise the bulk of the surficial deposits in the southwestern portion of the Presidio (Fig. 2-8). These are highly permeable and uniformly graded sands of aeolian origin. The material consists of clean, well-sorted sand -- yellowish-brown to light gray in color, fine to medium in coarseness. The dune sand ranges from 0 to 100 feet (0-30 m) in depth except in the vicinity of the installation's well field (southwest corner), where it is between 100 and 150 feet (30-45 m) deep. Slope debris and ravine fill constitute approximately one-fourth of the surficial deposits in the northern and south-central slope areas of the base (Fig. 2-8). The slope debris and ravine fill consist of angular rock fragments in a sand, silt, and clay matrix. The matrix consists of generally light yellow to reddish brown material of varying permeability. Maximum thickness of the unit is approximately 150 feet (50 m).[24,26]

Landslide deposits are developed along the western slopes of the property and are generally associated with the serpentine units (Fig. 2-8). The landslide deposits are generally unstratified mixtures of bedrock, sand, silt, and clay in varying proportions and varying depths.

Figure 2-8 shows that remaining surficial deposits are predominantly beach deposits and artificial fill. The beach deposits consist of well-sorted medium to coarse gray sand with some coarse gravel to a depth of 30 to 40 feet (10 to 12 m). The artificial fill is predominantly Dune sand but includes silt, clay, rock waste from excavations, manmade debris, and organic waste. (However, there is no documentation of adverse groundwater quality impacts resulting from this artificial fill.) The maximum thickness of the fill areas is approximately 60 feet (20 m).[26]

2.4.9 Endangered Species

Several endangered plant and animal species are found at the Presidio. The plants on the California endangered species list are the Presidio, or San Francisco, manzanita (*Arctostaphylos hookeri ssp. ravenii*); the Presidio, or San Francisco, clarkia (*Clarkia franciscana*); and the San Francisco popcorn flower, or Franciscian wallflower (*Plagiobothrys diffusus*).[21,27] PSF personnel have reported that the San Francisco lessingia (*Lessingia germanorum*), a California endangered plant species, is also present on-site.[28]

The California brown pelican (*Pelecanus occidentalis californicus*), on both the California and federal endangered species lists, is a common fall migrant to the Presidio area. The American peregrine falcon (*Falco peregrinus anatum*), the southern bald eagle (*Haliaeetus leucocephalus*), and the California least tern (*Sterna albifrons browni*), all of which are on both lists, are also occasional visitors to the area.[21,29] The San Francisco garter snake (*Thamnophis sirtalis tetrataenia*), also on both state and federal lists, may be on the post also, but its appearance has not been reported.[3,21]

2.5 ENVIRONMENTAL STUDIES AT PSF

Over the years, many aspects of the PSF environment have been studied and evaluated. They serve to describe the important environmental features of PSF as well as to provide baseline information from which to evaluate environmental impacts. Although many of the environmentally significant conditions described were subsequently remediated, these studies serve as a history of environmental concerns at PSF. They should be read from that perspective. These studies are summarized in Appendix A and referenced, where appropriate, in the Sec. 3 descriptions of environmentally significant facilities or events. Also summarized in Appendix A is relevant correspondence relative to incidents of contaminant releases.

The specific environmental studies and correspondence summarized in Appendix A are listed below.

2.5.1 Water Quality Evaluations/Consultations

- Water Quality Monitoring Consultation No. 66-0115-77, January 24-28, 1977[30]
- Water Quality Engineering Consultation No. 66-0179-78, May 30-June 2, 1979[31]
- Water Quality Engineering Consultation No. 32-66-0151-81, August 18-25, 1980[32]
- Water Quality Engineering Special Study (WZ) (Trihalomethanes in Drinking Water) No. 31-61-0196-82, August 24-28, 1981[33]
- Potable/Recreational Water Quality Survey No. 31-66-0106-84, October 11-15, 1983[34]
- Wastewater Engineering Survey No. 32-24-0502-84, December 12-16, 1983[35]
- Water Quality Engineering Consultation No. 31-6-0130-84, January 18-25, 1984[36]

- Water Quality Engineering Study No. 31-66-0105-84, January 26-February 12, 1984[37]

2.5.2 Hazardous Wastes/Hazardous Materials Studies

- Solid Waste General Survey No. 26-B04-75/76, LAIR/PSF, April 30, 1975[38]
- Waste Management Practices Survey No. 66-0169-78, December 9-12, 1977[39]
- Installation Pest Management Program Review No. 16-66-0516-80, November 13-16, 1979[40]
- Hazardous Waste Management Survey No. 37-26-0300-83, February 14-17, 1983[8]
- PCB Sampling and Analysis Report, February 9, 1987[41]

2.5.3 Geohydrologic Investigations

- Geohydrologic Consultation No. 24-0119078, June 26-30, 1978[24]
- Geohydrologic Study No. 38-26-0451-84, February 27-March 7 and May 14-22, 1984[7]
- Sampling and Analysis of Underground Storage Tank Release, Martech, December 13, 1988[9]
- Unauthorized Release from Underground Storage Tank Systems, June 22, 1989[42]

2.5.4 Air Emissions Study

- Air Pollution Consultation No. 44-21-0347-83, August 16-20, 1982[43]

2.5.5 Installation-Wide Assessment

- Installation Assessment of Presidio of San Francisco, Report 321, October 1983[3]

2.6 PERMITTING/LICENSING STATUS

2.6.1 Land and Buildings

The PSF is located on land owned by the federal government. Public Law PL 92-589, enacted Oct. 27, 1972, established the GGNRA within the DOI and included PSF within the GGNRA boundaries. Public Law 92-589 is reproduced in Appendix B. Except for the 100-acre Baker Beach area on the Pacific and the 45-acre Crissy Field area on San Francisco Bay, administrative control of PSF remains with the Army (see Fig. 2-3). These land areas were permitted to the DOI under Army permit DACA05-4-76-531 for Crissy Field (see Appendix C) and DACA05-4-74-542 for Baker Beach (see Appendix D). According to PL 92-589, when any PSF lands are excessed by the DOD, they shall be transferred to the jurisdiction of the Secretary of the Interior.[21]

A Memorandum of Understanding (MOU) between the Army and the California State Clearing House, Office of the Governor, dated August 1975, establishes communication between the Army and California regarding the functional, economic, and environmental aspects of plans and projects developed by either party for the area in and around PSF.[21] An MOU between the Army and the City of San Francisco was signed in 1970 and updated in 1977 (see Appendix E). This memorandum establishes communication and a mechanism for conflict-resolution between the two bodies in matters related to master planning, construction, and real estate utilization.[44]

A register of outgrants with PSF as the grantor is presented in Appendix F. These outgrants, involving both buildings and land areas with PSF, are generally for administrative use, utilities easements, or rights of way (see Appendix F).

2.6.2 Radioactive Materials[45]

Radioactive materials are used at both the LAMC and the LAIR. The use of radioactive material for diagnosis, therapy, and in-vitro testing is authorized by Nuclear Regulatory Commission (NRC) By-product Material License No. 04-01496-01; NRC Form 483, Registration Certificate - In Vitro Testing with By-Product Material under General License, Registration No. 6218, dated March 8, 1982; and DA Radiation Authorization No. 04-05-81. Use of radioactive materials at the LAIR is under the authority of the license granted to the LAMC.

2.6.3 Water and Wastewater

National Pollutant Discharge Elimination System (NPDES) Permit No. CA 0006904 was issued to PSF on Dec. 31, 1973, originally for washrack and filter backwash discharges from the water treatment plant. Compliance involves monitoring for, and elimination of, discharges from the water-treatment plant and distribution system to the environment and chemical and bacteriological monitoring of the water-distribution system.[30] However, as a result of operational changes, this NPDES permit has been judged unnecessary and since withdrawn.

In 1935, the City of San Francisco and the U.S. War Department made an agreement stating the U.S. government could connect the sewer line of PSF to the city sewage collection line without payment of any kind to the city. In exchange, the government granted an easement for the right-of-way of a city sewer line across the Fort Mason Military Reservation. Another sewer line easement was granted across Fort Mason in 1976. The National Park Service has maintained these agreements, and the term of easement is due to expire on August 6, 2006. Wastewater from facilities not in place in 1935 is treated for a "flat rate" by the city.[35] The PSF does not routinely monitor wastewater flows entering the San Francisco sewer system from the post. Sewage is treated by the city.[21]

2.6.4 Solid Waste

Collection and disposal of solid wastes generated at PSF are contracted to private firms. These firms are properly licensed and dispose of the waste at appropriate and properly licensed sanitary landfills off the site. There are no active landfills on PSF. There is one-solid waste transfer station operating at PSF. No operating permit is required for this transfer station. Volunteers operate a recycling center in Bldg. 204 for corrugated paper, computer cards and printouts, newspapers, and aluminum cans.[21]

2.6.5 Hazardous Waste

The PSF is a permitted generator of hazardous waste, having identification number CA 7210020791, which was granted in January 1980. PSF Regulation No. 200-1 Hazardous Waste Management, implemented in January 1982, establishes policies, procedures, and responsibilities for management of hazardous waste.[8]

2.6.6 Air Quality

Nineteen air pollution sources at PSF have been identified as nonexempt by the Bay Area Air Quality Management District (BAAQMD) of San Francisco. The 19 sources are listed in Table A-7. Each has been registered with BAAQMD. The two major heating plants (Bldgs. 1040 and 1802) which individually exceed the 2.5-tons-per-year emission standard for nitrogen oxide have also been registered as required.[43]

The LAMC operates an incinerator. However, no information on air quality permits for this incinerator could be located.

2.7 POTENTIAL ENVIRONMENTAL IMPACTS IN VICINITY OF PSF

The Environmental Protection Agency Region 9 Office, San Francisco, has identified 37 potential Superfund sites in the vicinity of PSF. These Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) sites are identified in Table 2-5, and their locations relative to PSF are displayed in Fig. 2-9.

TABLE 2-5 Identified CERCLIS Sites Near PSF

	Number and Site	USEPA ID #	Street Address or General Location
1	Armstrong, James vacant lot	CAD980736052	2250 Jerrold Ave.
2	ASARCO	CAD009134636	1901 Army St.
3	C &M Plating Works	CAD 009204736	598 Sixth St.
4	Candlestick Pt state rec. area	CAD980893374	S of Hunters
5	Consolidated Iron & Metal	CAD980884969	634 Townsend St.
6	Cookson Co.	CAD982358616	1525 Cortland Ave.
7	Federated Fry	CAD982400111	1901 Army St.
8	Gamlen Chemical Co.	CAD982358491	195 San Bruno
9	Golden Gate Nat. Rec. Area	CA2141732030	Building 201, Ft. Mason
10	GSA federal building	CA4470000098	450 Golden Gate Ave.
11	Imperial Drayage Co., Inc.	CAD063014658	715 Army St.
12	Islais Creek area	CAD980637011	East side of bay
13	Knudson Park	CAD980674048	Potrero between 24th & 26th
14	McKinnon	CAD982029001	2100 McKinnon St.
15	Metten & Gebhardt Tannery	CAD009122656	1775 Egbert Ave.
16	NL INDS INC.	CAD980637003	2240 24th St.
17	PG&E Gas Plant SanFran 502-1	CAD981415292	First Howard Fremont Natoma St.
18	PG&E Gas Plant SanFran 502-1A	CAD981415359	Market & Jane (Jane no longer)
19	PG&E Gas Plant SanFran 502-1B	CAD981415417	King & 2nd streets
20	PG&E Gas Plant SanFran 502-1C	CAD981415474	22nd 23rd Michigan SF Bay
21	PG&E Gas Plant SanFran 502-1D	CAD981415532	King NR 3rd St.

TABLE 2-5 (Cont'd)

	Number and Site	USEPA ID #	Street Address or General Location
22	PG&E Gas Plant SanFran 502-1E	CAD981415599	8th & Channel St.
23	PG&E Gas Plant SanFran 502-1F	CAD981415656	Filmore Steiner Bay San Francisco
24	PG&E Gas Plant SanFran 502-1G	CAD981415714	Bay North Point Buchanan Laguna
25	PG&E Gas Plant SanFran 502-1H	CAD981414998	23rd & Maryland
26	PG&E Gas Plant SanFran 502-1I	CAD981415052	Columbus between Levenworth & Hyde
27	PG&E Gas Plant SanFran 502-1K	CAD981415110	Stevenson between 5th & 6th streets
28	PG&E Gas Plant SanFran 502-1J	CAD981415268	680 Beach St.
29	PG&E Potrero Power Plant	CAT080011703	1201 Ill. St.
30	Presidio of San Francisco	CA7210020791	Presidio of San Francisco
31	Rickes and Sons	CAD982358558	1831 Egbert Ave.
32	Treasure Island Naval Station	CA7170023330	Treasure Island Naval Station
33	Treasure Island Naval Station HNT PT AN	CA1170090087	Hunters Point Naval Shipyard
34	U.S. Coast Guard Base	CA6690390046	Yerba Buena ISL
35	U.S. Customs Service lab	CA9470090177	630 Sansome St. RM1508
36	U.S. Postal Service vehicle maintenance	CA5180090362	1300 Evans Ave.
37	301 Howard Street Assoc.	CAD982358434	NE corner of Howard & Beale

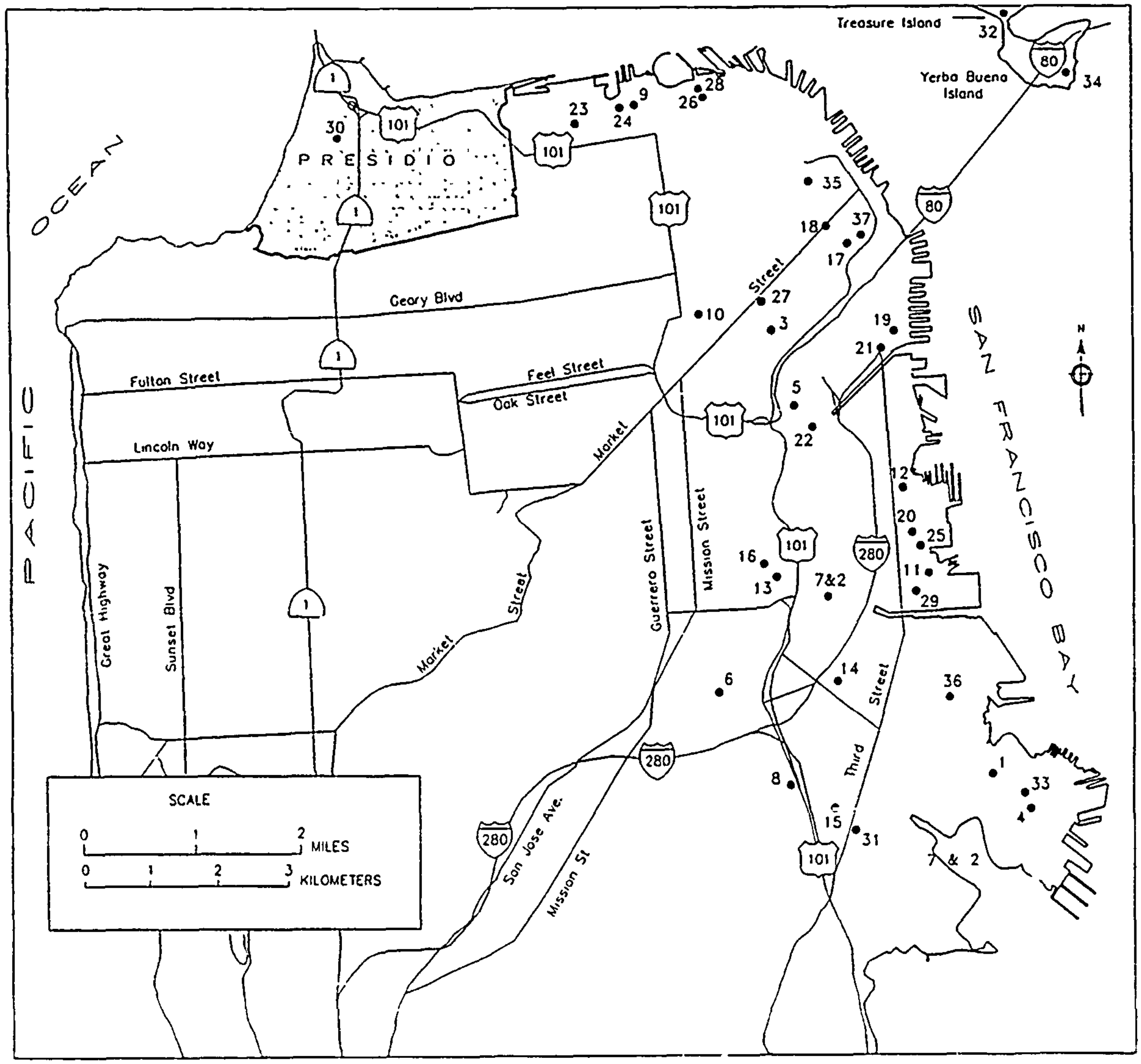


FIGURE 2-9 Identified CERCLIS Sites in Vicinity of PSF

This listing of sites is derived from USEPA's CERCLIS site listing, implying only the *potential* for environmental impacts, as surmised from reports of past waste generating and handling activities known to have taken place at these locations. None of these sites has been fully characterized, however, or is listed as yet on USEPA's National Priorities List (NPL) of Superfund sites. Given the locations of these CERCLIS sites and their distances from PSF, none is expected to have adverse impact on PSF. It should also be noted that PSF itself is on the CERCLIS list (#30). PSF officials have reported that this is the result of hazardous waste generation and interim storage which occur at PSF. Normally, when USFPA places a site on the CERCLIS list, the entire contiguous facility is considered to be included in the listing, even if only certain activities are the basis for the listing.

In addition to identified CERCLIS sites near the PSF, a number of other potentially environmentally significant activities occur in its vicinity. Although the areas immediately adjacent to PSF to the east and south are largely residential in character, there are some retail businesses located throughout these areas such as gas stations and dry cleaners that might be expected to store hazardous materials in bulk. However, there is no documentation of releases from any such facility near the PSF.

3 ENVIRONMENTALLY SIGNIFICANT OPERATIONS

3.1 INDUSTRIAL OPERATIONS[2,3]

The industrial operations performed at PSF are associated with maintenance and repair of vehicles and base facilities, the latter including buildings, roads, and utilities. Other operations in support of the various functions on the installation include laundry, photographic processing, and minor maintenance and repair of furniture, small arms, and electronic equipment. Each of these activities uses some trade-specific hazardous chemicals, and the subsequent hazardous wastes generated require different modes of treatment, recycling, or disposal.

3.1.1 Vehicle Maintenance Shops (Buildings 283, 662, 924, 926, 937, 1351)[2,3]

There are six vehicle maintenance shops on site. The DOL operates two; the DEH, Company C of the 864th Engineering Battalion, the reserve forces, and the DPCA each operates one. The base SPCCP has been formulated to define and coordinate response to chemical spills and releases. Stripping and degreasing solvents are handled by Safety-Kleen Corp. in most shops. Oil and other vehicle fluids and battery electrolytes are collected at each work station and then accumulated in 55-gallon drums outside of the buildings. Hazardous wastes generated at the DEH maintenance shop are stored in the DEH complex, behind Bldg. 268 (see Fig. 3-1).

Building 283[2]

This pre-WWII shop shows its age and heavy use. The building was at one time used for removal and repair of aircraft engines. A 6,000-pound diesel lift and two very old tanks for compressed air for the lifts are still in place. The floor inside the shop area shows heavy oil staining. Sorbent material is scattered on the floor to soak up spills.

A parts washer rests on pallets inside a tent with exhaust hood and concrete flooring. The spent solvent is mixed with waste oil and drummed for ultimate disposal. This waste mixture is not identified or handled as a hazardous waste by DEH personnel. (No recycling of degreasing solvents is practiced at this shop.) Spent batteries are stored on wooden pallets housed in a brick enclosure inside the shop. The room is equipped with an eye wash facility, but there is no caustic soda on hand to neutralize any acid spills.

Waste POL materials are stored in drums resting on pallets in a small shed outside of the shop area. The shed has a 4-inch berm surrounding the wooden pallets to contain spills inside the shed. However, the asphalt paved ground immediately outside of the shed shows very heavy staining.

Building 662 (DPCA)[3,12]

This automobile hobby shop enables military personnel to maintain and work on privately owned vehicles. Prior to the Army's substitution of motor for animal transport,

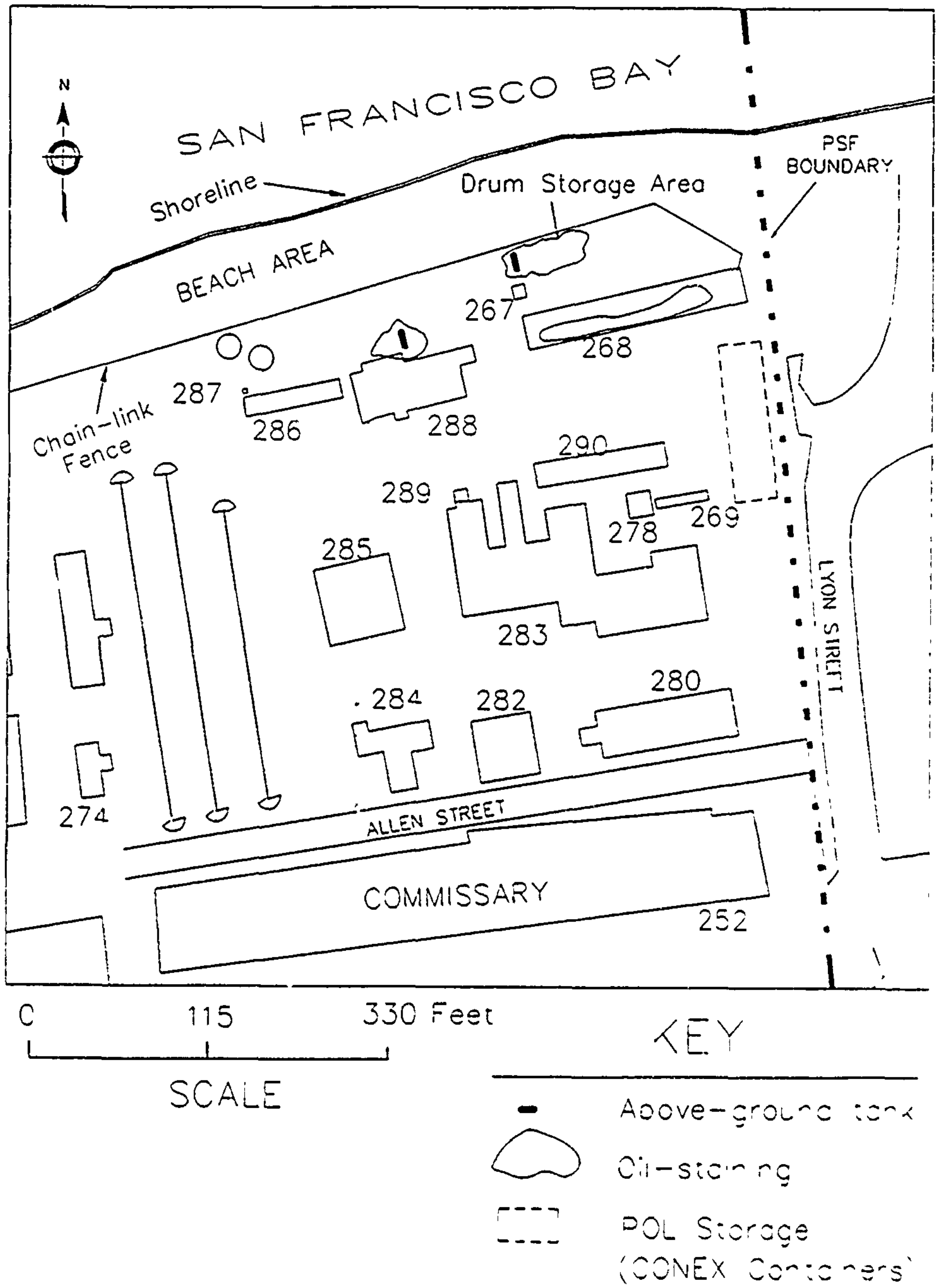


FIGURE 3-1 DEH Complex, PSF

Bldg. 662 was part of a stable complex. Operations performed in the shop now intermittently include oil servicing, solvent degreasing, engine tune-up and repair, tire and battery replacement, brake repair, and a limited amount of body work and painting. Waste generated in Bldg. 662 is drummed and sent to Bldg. 638 to await collection and disposal by a private contractor. A washrack located near the building has no oil/water separator and is connected directly to the PSF sanitary sewer system. No evidence of past spills was observed in the general area of this maintenance shop.

It has been reported by USATHAMA that a survey conducted by E.C. Jordan in September 1989 revealed an underground tank in the vicinity of Bldg. 662. No additional details regarding this tank are known.

Building 924[2,3,8]

Built in 1958 in support of the Nike program in the Bay area, the shop is now mainly used for maintenance of large vehicles. Sheet metal work, oil servicing, engine tune-up and repair, tire and battery replacement, brake repair, and cutting, grinding and welding of metal components are performed here. A large quantity of lube oils and greases, along with a small amount of flammable materials such as methyl ethyl ketone, naphtha, alcohol and acetone are stored on racks or in metal cabinets at this shop. Brake replacement and cleaning is done on a limited basis. A wet washer, no longer in use, was originally used to wash away brake debris containing asbestos fibers. These washwaters were discharged to the sanitary sewer. A high-performance filter, which traps very fine particulate matter, is now used in a vacuum cleaner apparatus to collect asbestos particulate, which is then double-bagged and disposed of at the dumpster.[8] Shop personnel also repair small arms. Small arms are test-fired into a target mounted on a cliff behind the shop. Up until five years ago, parkerizing (coating steel articles with phosphates by immersing them in phosphoric acid containing salts of magnesium or zinc) was performed here. Waste phosphatizing solutions were periodically discharged to the sanitary sewer. Such practice is no longer allowed.

The shop engaged the service of Safety-Kleen Corp. approximately four years ago. Safety-Kleen has installed low-pressure, solvent-recirculating parts degreasers throughout the shop, hauls waste solvents and accumulated sludges away for recycling on a regular basis, and provides replacement recycled solvents. Prior to that, virgin degreasing solvents were used in parts washers of similar design. The waste solvents were drummed and stored behind the facility for off-post disposal. Reportedly, prior to off-post disposal arrangements, some waste solvents may have been disposed of on-post at one of the sanitary landfills which were operational in the past. However, no documentation exists to support this report.

The backyard area near the hillside has a storage shed for flammable materials near the building. It now contains metal piping and small aerosol cans. Near the shed, scrap metal wastes are placed in a container awaiting pickup. Fresh petroleum, oils, and lubricants (POL) in five gallon cans are stored in a Container Express (CONEX) container. Bulk oils are being phased out. However, one above-ground bulk oil tank was still in use at the time of site assessment. A metal trough under the spout serves as a secondary containment measure. One old diesel oil tank (with a capacity of about

400 gallons) is now used for waste oil storage; it sits directly on soil without secondary containment. There is slight petroleum staining of soils near this tank. Other POL wastes are drummed and placed on pallets with metal troughs beneath; approximately six drums were awaiting collection at the time of the site investigation. Three old transformers, not tested, were also observed abandoned in the backyard. There is also an underground storage tank adjacent to Bldg. 924, which was reportedly used for oil. (See Sec. 3.7 for additional discussion of above-ground tanks and Sec. 3.8 for additional discussion of underground tanks.)

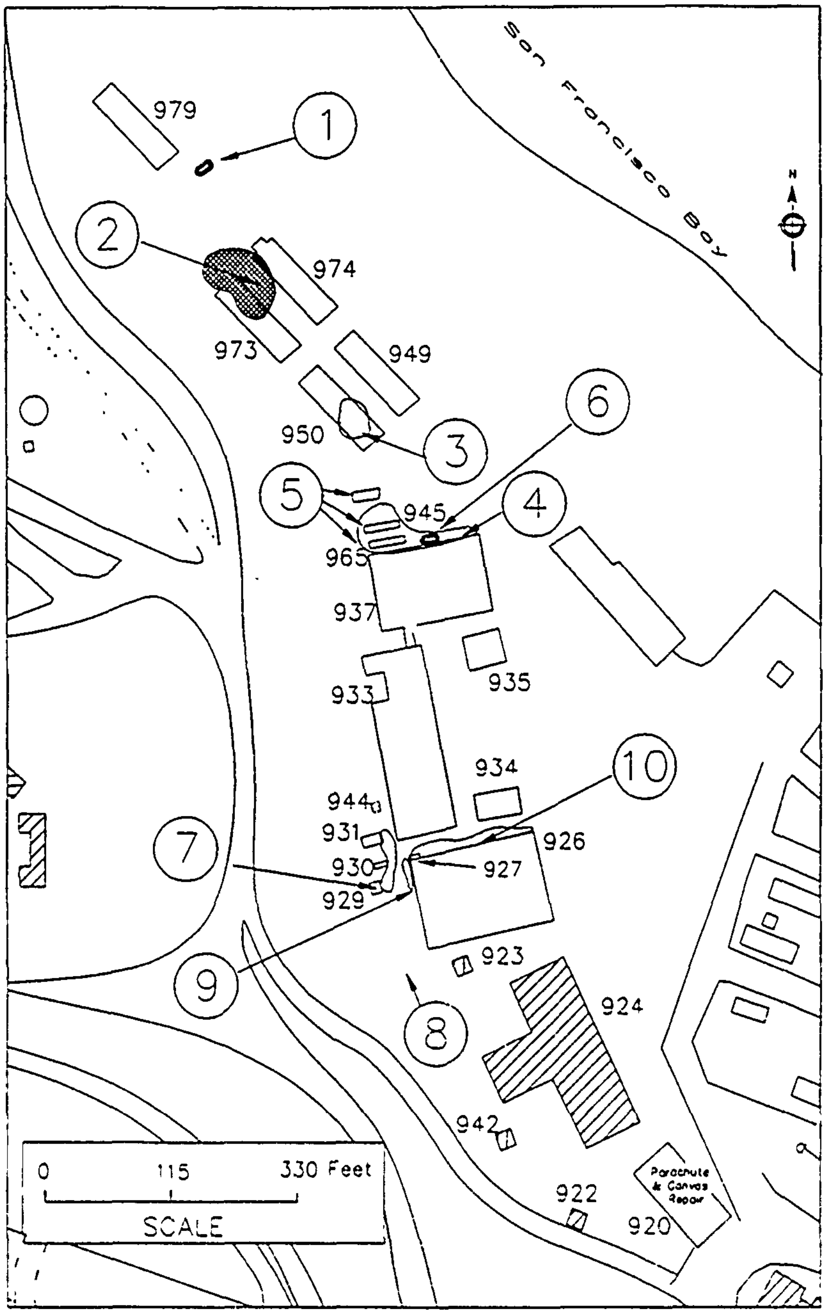
Building 926[2,3,7,8,46,47]

This building was built in 1921 as an aircraft hangar for Crissy Field.[8] Figure 3-2 shows the general site plan of Bldg. 926 and other buildings in the DOL maintenance area at Crissy Field, as well as the relative locations of environmentally critical activities occurring in this area. Four 10,000-gallon underground gasoline storage tanks were once located behind the building, with pipes feeding the fuel to remote valve locations on the northwest corner of hangar Bldgs. 926 and 937.[2,47] Reportedly, the four 10,000-gallon tanks were removed from this vicinity in 1942.[47] (It is not known whether the associated piping was removed.) No documentation was found confirming these tank removals. Since the closure of the air base in 1936, the building has been used for major vehicle body work, painting, and battery recharging. Before the mid 1980s, Stoddard Solvent, Type I, was used for the cleaning of repair parts. The waste solvent was mixed and disposed of, along with waste oil generated at the facility, by an oil-reclamation contractor.[3] The facility has since engaged the services of Safety-Kleen Corp. for their parts degreasers. As is the case for the Bldg. 924 shop, Safety-Kleen provides low-pressure, solvent-recirculating parts washers. It also recycles solvents and removes waste solvents and sludges periodically.

ANL investigators noted what was apparently a filler pipe to an underground tank located outside the front (east) of Bldg. 926. However, no records were found which confirm the existence of a tank in this area. PSF personnel also have no knowledge of a tank in this area. It is also possible that this filler pipe may have been associated with the four 10,000-gallon USTs reported to have been removed from behind Bldg. 926. (See Sec. 3.8 for additional discussion of underground tanks.)

Fresh paint and POL are stored in Bldg. 931, behind Bldg. 926. Vehicles and vehicle components are spray-painted using a wet curtain spray booth at the rear of the building. About 200 gallons of wastewater are discharged from the recirculation systems, every 2 to 3 months, to the PSF sanitary sewer. Sludges are removed periodically from the water curtain and drummed for off-post disposal as hazardous waste. Lead-based paints are used in this painting operation and are classified as a hazardous material. Waste paints and sludges, therefore, are included in the post-wide hazardous waste disposal program.[3]

Other maintenance shop wastes, including waste solvents, are temporarily stored in drums placed on wooden planks in the yard to the southeast of Bldg. 926. No secondary containment is provided for this drum storage area, which showed significant staining of the pavement.[2] Also located behind Bldg. 926 is a high-pressure steam rack



KEY

Waste sandblast materials

Oil-staining

1 Abandoned gas pumps
2 Sandblasting area
3. Waste POL storage
4 Underground storage tank (xylene)
5 Vehicle maintenance platforms (3)
6. Underground storage tank (waste oil)
7. Paint and solvent POL
8 Steam rack with three-stage oil/water separator
9 POL waste accumulation from paint shop
10. Battery storage area

FIGURE 3-2 DOL Complex, Crissy Field, PSF

with a 3-stage oil/water separator. Machinery is washed there, and the wastewater generated is passed through the separator before being discharged into the storm sewer, which outfalls to San Francisco Bay.[2] Building 926 also serves as a collection point for storage batteries at PSF. Electrolytes are drained from the batteries inside the building. The spent electrolytes are hauled by a contractor to an approved disposal site. The drained, spent batteries are placed outside on pallets against the northwest wall. There is no spill-containment provision in this storage area, and some evidence of corrosive deterioration of the asphalt pavement was evident. An average of 30 batteries per month are palletized for ultimate disposition by the Defense Reutilization and Marketing Office (DRMO) in Alameda, Calif.[9,10] Building 927, a small structure attached to Bldg. 926, formerly served as a transformer vault. According to one person interviewed, transformers are no longer stored there.[46] Military vehicles are parked on paved ground in the front yard of Bldg. 926, facing the Golden Gate Bridge. Some staining of the ground is evident in this area.

Building 937[2,3,7,8,46]

Built in 1921 as an aircraft hangar at Crissy Field, this building is currently the main vehicle maintenance shop for the DOL. Figure 3-2 shows the location of Bldg. 937 and other maintenance shops and support buildings in the DOL complex at Crissy Field. Large vehicles such as heavy trucks and tactical vehicles are maintained here. Operations include oil servicing, solvent degreasing, engine tune-up and repair, tire and battery replacement, and brake repair. Approximately 75 vehicles are serviced here per month. Floor drains in the building which lead to the sanitary sewer do not have grease traps.[2,3]

According to information reported in a 1983 installation assessment of PSF,[3] approximately 35 gallons of spent battery electrolytes are drained from the batteries every month in Bldg. 937. Waste electrolyte is contract-hauled to an approved disposal site. Spent batteries are recycled or sold through the Defense Reutilization and Marketing Office (DRMO) (formerly the Defense Property Disposal Office [DPDO]) of the Department of Defense (DOD). In addition, one 20-gallon bag of asbestos waste, the residue from brake linings collected by high-performance filter equipment, is generated on an average of every two weeks. The asbestos waste is double-bagged, properly labeled, and disposed of in the dumpster.[2,3]

Vehicle and equipment parts were formerly cleaned with Stoddard Solvent, Type I. The spent solvent was mixed with waste oil before being hauled off-base by an oil-reclamation contractor.[3] As is the case for the DOL shop in Bldg. 926, Safety-Kleen Corp. now supplies the parts washer and solvent and removes spent solvents for recycling on an as-needed schedule.[2] Approximately 2,100 gallons of solvent are used per year. Of that, approximately 1,800 gallons per year are returned for recycling (some solvent is lost through parts wetting and evaporation).[2]

To the northwest of the building are two vehicle-maintenance ramps (labeled Bldgs. 945 and 965). These ramps are equipped with below-ground piping, which leads to a 1,000-gallon underground waste-oil tank adjacent to the north building wall. This waste oil tank is said to no longer be in use, but the tank and its associated pipes are still in

place. The ramps are still used for vehicle oil changes and maintenance. Oil is collected and drummed for shipment to off-site disposal. ANL investigators noted that sand was scattered under the ramps. There is very heavy oil staining of the ground in the vicinity of these vehicle maintenance racks and at the evacuation pipe of the waste oil tank. A third vehicle maintenance ramp is located approximately 20 feet north of the two ramps, near Bldg. 937. This third ramp does not appear to be equipped with piping connecting it to the waste-oil UST near Bldg. 937. This ramp also appears to not have been in recent use.[2]

Waste POL materials stored in 55-gallon drums are placed in Bldg. 950, north of Bldg. 937. Building 950 is a pole-building design (i.e., no walls). It has paved flooring but is unbermed. Waste stored here includes spent thinner, oil and drummed waste from DEH maintenance activities, and waste from other motor pool areas. Oil staining of the concrete foundation of Bldg. 950 was apparent in the drum storage area.[2]

Reportedly, a 1,000-gallon underground tank along the north wall of Bldg. 937 formerly stored petroleum-based solvents (such as xylene) used for stripping lacquer from canvas aircraft wings in the 1930s. It was also reported that this tank may have contained kerosene. The integrity of this tank has not been checked for some time.[46] The contaminant trans-1,2-dichloroethene, found in one of the water samples taken from a monitoring well near the building (see App. A), could potentially be associated with the tank. This tank and its contents are reportedly no longer in use.

Another tank adjacent to the north side of Bldg. 937 identified as a "waste oil" tank, stored liquid wastes including diesel fuel, waste oil, paint and lacquer thinner, carburetor cleaner, and degreasing solvents. This tank also received waste oils from either of two vehicle maintenance ramps located beside Bldg. 937 through a system of underground pipes. The drain pipe inside Bldg. 937 was damaged in 1981 during an excavation inside the building. The resulting spill of waste contents and subsequent actions will be further discussed under Sec. 3.4.2. Altogether, 23 monitoring wells were placed in and around Bldg. 937 in 1984.[2,3,46] According to Stetson Engineers, Inc., which conducted the most recent evaluation of the Crissy Field area (in 1986), the integrity of this waste-oil storage tank is still in question.[46] (See Sec. 3.8 for additional discussion of underground tanks.)

Building 973[2]

Sandblasting operations were observed in an open area east of Bldg. 973 during the site inspection. Air releases were very heavy. There was no containment of spent sand and paint chips, which possibly contain heavy metals such as lead and chromium. Spent sand is allowed to lay on the paved surface until it is periodically removed, without analysis, for disposal as solid waste.[2]

Building 1351[2]

This vehicle maintenance shop, built in the 1950s, is south of the motor pool, which is near Battery Dynamite, and is currently used by the 864th Engineering Battalion

primarily as a facility for small-parts replacement. The facility is well maintained. An eye-wash station is located next to a low-pressure, solvent-recirculating parts degreaser, which is serviced by Safety-Kleen Corp. Flammable materials are stored in a cabinet near a tool room cage south of the facility. Reportedly, brakes are removed in the shop but not dissembled, indicating a minimal asbestos hazard and no generation of asbestos wastes.

Outside, POL in 5-gallon cans is stored in five CONEX containers; two to the south of the shop and three more down the ramp. POL targeted for more immediate use is set aside on nearby ground, close to an antiquated fire extinguisher. An old trash bin is used to hold empty oil cans and other debris. Waste POL is stored in several drums and a tank. The tank is a converted water tank ("water buffalo"). The tank and drums are placed on pallets within a concrete berm. There was heavy oil staining within the berm, but no evidence of contamination in the surrounding area. POL wastes are managed as hazardous wastes and hauled away by a private contractor every three months.

Next to the POL area, two new washracks equipped with oil/water separators and curbing were installed in early 1989. These are replacements for the old, unsafeguarded washracks originally located in this area. Reportedly, debris from the old washracks sometimes clogged the storm sewer into which wastewater drained. As a result, a private contractor was hired to clean up the storm sewer line periodically. The new wash racks discharge to the sanitary sewer. The oil/water separators are maintained by private contractor as needed.

3.1.2 Painting (Buildings 285 and 1167)

Building 285[2]

Signs, vehicle components, and furniture are painted in the shops of Bldg. 285. Enamel paints, mainly KEM-Lustrel™ outdoor paint, with chromate and lead primer, are used. A spray booth inside the paint shop is equipped with a dry filter system to control paint emissions generated during spray painting. The filters are changed after each job and disposed of in a dumpster as solid waste. No analyses of these filters for hazardous characteristics have been performed. The exhaust hood near the window was reportedly installed approximately 10 years ago. An old air compressor, no longer in use, was observed inside the building.

A large room is designated as a sign shop. Interior and exterior latex paints are used here. An infrared vacuum applicator purchased in 1969 has greatly reduced the amount of paint usage, which, at present, stands at approximately 1,000 gallons per year. Shop personnel could not provide a specific volume of waste currently generated from this operation.

A room near the office has a drum for waste storage and a sink in the southeast corner for cleaning equipment. The sink is not equipped with a trap, and paint waste therefore drains directly into the sanitary sewer system. However, only latex-based paints are flushed to this drain. Waste paints and paint thinners are drummed and sent to

the DEH hazardous-waste storage area behind Bldg. 268 for eventual off-site disposal. Approximately 1-1/2 drums of waste are generated per month by paint shop and sign shop operations.

Outside the shops, three transformers were observed on wooden pallets. They are surplus, ordered two years ago but never used. DEH personnel have reported that these transformers do not contain PCBs. Labels on the transformers also gave no indication of PCB presence in the dielectric fluids in these transformers.

Building 1167[2,3]

This shop is used for stripping and painting of furniture and a small amount of woodwork. Alcohol-base paint thinner is brushed onto furniture being stripped, and the resulting residue is rinsed off with water or scraped off. Approximately 5 gallons of this residue are generated per week. Since primarily lacquers are stripped from furniture rather than metal-based paints, the heavy metal content of the residue is probably very low. The residue is included in the postwide hazardous-waste disposal program.

The shop has a wet curtain spray paint booth, which discharges recirculated water to the sanitary sewer. The sludge, which has not been tested for hazardous constituents, is disposed as solid waste in a nearby dumpster. No estimates of sludge volumes are available.

3.1.3 Laundry (Building 1047)[2,3]

At present, Bldg. 1047 operates as a laundry facility for the hospital. Solvents (perchloroethylene, primarily) are used for spot cleaning, but no dry cleaning is done here. According to the 1983 USATHAMA report,[3] approximately 2,400 gallons per day of wastewater are generated and discharged to the sanitary sewer. No problems have been reported from this discharge. Reportedly, an underground oil tank is located adjacent to the building.

3.1.4 Printing Plant (Building 1244)[3]

The Field Printing Plant generates 50 to 60 gallons of spent photographic developing solution per month. Prior to 1974, the solution was discharged to the sanitary sewer. From 1974 to 1979, it was placed in 5-gallon cans and transported to the Defense Property Disposal Office (DPDO) facility for silver recovery and ultimate disposal. (DPDO is now known as the Defense Reutilization and Marketing Office [DRMO]). Since 1979, the plant has performed its own silver-recovery and discharged the effluent to the sanitary sewer. The recovered silver (in specially designed cartridges) is recycled through the DRMO. Reportedly, there is an underground oil storage tank adjacent to Bldg. 1244. (See Sec. 3.8 for additional discussion of underground tanks.)

3.1.5 Washracks[2,3]

There are five washracks for military vehicles and equipment currently in operation at PSF. Two relatively new ones are located at the 864th motor area (Bldg. 1351), one at the DEH complex in the northeast part of PSF (near Bldg. 268), one behind Bldg. 926, and one at Bldg. 662. All facilities discharge waste water into the sanitary sewer. All except for the one at Bldg. 662 are equipped with oil/water separators. The Bldg. 662 washrack is connected directly to the PSF sanitary sewer system.

A vehicle washing facility for privately owned vehicles is operated under AAFES control in Bldg. 206. See Sec. 2.2.3 for descriptions of the washing facilities in Bldg. 206.

3.2 WASTE STORAGE

Currently, both DEH and DOL maintain hazardous-waste storage areas at which all hazardous wastes generated by each Directorate's shops are collected prior to shipment off-site for disposal or treatment. The DEH waste storage facility is located behind Bldg. 268, while the DOL waste storage occurs in Bldg. 950. Each waste-storage area is also used to store materials and supplies as well as nonhazardous wastes. These areas are discussed below.

In addition to the two largest waste storage areas, there are numerous satellite areas for accumulating wastes maintained by individual generators of hazardous wastes. Descriptions of those satellite waste-storage areas are found in the discussions of the individual buildings or shops.

Finally, the solid-waste transfer station (see Landfill Area #3, Fig. 3-4) has become an ersatz waste-storage area as a result of DEH personnel periodically removing hazardous wastes that are inappropriately placed in the transfer station containers. The transfer station is discussed in conjunction with landfill area #3, Sec. 3.11.

3.2.1 DEH Storage Yard[2]

At the time of the site visit, the asphalt-paved yard behind Bldg. 268 was littered with an abandoned refrigerator, paint cans, sinks, plywood, and other debris. DEH drummed wastes were stacked on wooden pallets clustered near a CONEX container (contents unknown) in an area without spill containment. There was visible staining on the ground near the drums. A trailer, apparently used as an office, was parked near the barbed wired fence enclosing this storage yard. An above-ground storage tank was next to the trailer, on a slab of concrete, with no secondary containment. It holds approximately 200 gallons of fuel used for heating the trailer. There was heavy staining of the ground surface in the vicinity of this tank. To the east of the tank, separated by a short, walled partition, was a bermed washrack equipped with an oil/water separator .

Also in the storage yard to the west of the drummed waste-storage area behind Bldg. 288 was a 10,000 gallon above-ground oil tank, reported to no longer be in use.

Aged oil left inside the 2-foot high concrete berm was observed to be around 6-inches in depth. Some oil staining of the pavement outside the berm was also observed. This portion of the DEH storage yard is also littered with wind-blown sand from the beach area (along San Francisco Bay) just north of the storage yard beyond a chain-link fence. Abandoned water tanks, big electric fans, rubber, and various metal debris were piled in the DEH yard awaiting monthly pickup by private contractors. In addition, this yard also is used to store DEH equipment.

3.2.2 Waste POL, Building 638[2,3]

The POL drum storage area adjacent to Bldg. 638 is a consolidated storage area for waste POL generated base-wide. It is well designed to contain potential spills. Any spillage or surface runoff is directed to an oil/water separator, and the separator effluent drains to the sanitary sewer system.

An above-ground oil storage tank with a 275-gal capacity is reportedly located in this area. Its status is unknown. (See Sec. 3.7 for additional discussion of above-ground tanks.)

3.3 HAZARDOUS MATERIAL STORAGE

3.3.1 Pesticide Storage and Mixing Facilities[2,3]

Pesticides used at PSF are stored in a shed adjacent to Bldg. 269 and in Bldg. 293. Pesticide warning signs are conspicuously posted outside both storage facilities. The application of pesticides at PSF is performed according to USAEHA criteria. The principal pesticide applicators are certified in accordance with Army regulations.

In 1982, the pest management program was reviewed by the USAEHA.[48] The essential finding from this report was that actions were required by PSF to improve pest surveillance and control, and to insure the safety of pest control personnel. The major recommendations were:

- Prepare a written SOP for pest controllers to address the selection and use of respirators.
- Provide pest controllers with individual protective clothing and equipment to insure their safety while applying pesticides.
- Take necessary measures to prevent backflows of pesticides from contaminating the potable water system.
- Establish a raccoon-control program for PSF.

The mixing and formulation of pesticide solutions are currently performed in Bldg. 269. This building consists of one big room with pesticides stored on racks. The area designated for mixing pesticides occupies the northeast quarter of the room. This area has concrete flooring surrounded by shallow raised curbing on two sides (the other two sides are walls), and is equipped with a counter and sink, eye wash station, and a ventilation hood. The floor drain collects runoff and routes waste pesticides to a 1,500 gallon subsurface concrete holding tank adjacent to the building. (See Sec. 3.8 for additional discussion of underground tanks.) A private contractor removes the waste solution periodically and disposes of it at an approved hazardous-waste disposal site. The empty pesticide containers are usually triple-rinsed, punctured, and disposed of in a nearby dumpster as solid waste. There have been no major spills or releases from this facility.

On some occasions small quantities of pesticides are reportedly mixed on trucks prior to application. Large quantities (50-100 gallons) of pesticides are mixed on a curbed concrete slab located near the DEH carpenter shop. Appendix I is a listing of pesticides currently on hand at PSF.

3.3.2 Buildings 634 and 640[2,3]

These buildings are used for temporary and permanent storage of hazardous materials. They have unbermed concrete floors. Building 634 does not have spill cleanup and containment equipment.

3.4 DOCUMENTED SPILL INCIDENTS

There have been five major documented spill incidents at PSF (When used in this context, "documented spill incidents" are those for which analytical results of soil, surface water, or groundwater sampling confirm the release of contaminants to the environment.)

There may have been numerous other accidental releases over the years, and although many of those incidents are well corroborated, they remain undocumented with respect to analytical results. All known incidents of spills or accidental releases, whether observed or documented, are discussed in Sec. 4.

Each of the five documented spill incidents is described briefly below.

3.4.1 Pesticide Spill[2,48]

In 1980, the Post Exchange, Bldg. 609, was the site of a pesticide spill. A private company was contracted for total cleanup of the contaminated area and proper disposal of all cleaning materials and contaminated products. Residue removal efforts are thought to have been successful, and no additional remedial action is believed to be necessary. It is reported that this building was demolished in 1987. PSF personnel have reported that building demolition debris from Bldg. 609 was disposed off-site at a

permitted landfill. No documentation could be located to confirm the successful cleanup of the pesticide spill, although a report of this cleanup effort is believed to exist.

3.4.2 Building 937 Oil Spill[2,3,7,46]

Building 937 is a vehicle maintenance shop in the northern part of the PSF, near the Golden Gate Bridge. Inside the building is a drain pipe leading to an underground storage tank adjacent to the building. Waste liquids carried by the pipe include diesel fuel, waste oil, paint and lacquer thinner, carburetor cleaner, and degreasing solvents. In November 1981, an area inside the building near the drain pipe was excavated to install a hydraulic lift. A thick (8- to 72-inch) layer of waste oil was discovered floating on top the groundwater table. Subsequent investigation showed the pipe to be broken and perforated. An unknown quantity of water and oil was removed and taken off-site. The broken pipe was sealed and the tank pressure tested at 20 psi for three days to ensure the absence of other leaks.

A sample of the bulk oil overlying the ground water was analyzed by EAL Corp. for organic priority pollutants. Various volatile organic compounds were detected, as well as some base/neutral and acid extractable organic compounds. This study is summarized in Appendix A in the discussion of Geohydrologic Study No. 38-26-0451-84 (Sec. A.3.4), which USAEHA conducted in 1984 in the area of Bldg. 937.[7] Included as part of that investigation was the chemical analysis of the waste product and the drilling and construction of 23 monitoring wells. Ten monitoring wells were drilled close to the tank, and another 13 were strategically placed at the periphery of the premises within the fenced maintenance area as shown in Fig. A-4. In 1986, Stetson Engineers, Inc. conducted a hydrogeologic review of the Crissy Field area.[46]

3.4.3 Building 979 Waste POL Spill[2,3]

This building was built in 1921 and was formerly used as a vehicle maintenance shop and gas station by the 170th MP Company. At present it is used as a storage area for construction materials and paints.

A waste POL spill occurred in January 1982. It resulted from leaving a funnel in the uncapped inlet pipe leading down to the underground waste POL storage tank near Bldg. 979. A heavy rainfall occurred, and storm water displaced oil in the tank, forcing oil up the inlet pipe and onto the ground surface. About 50 to 100 gallons of oil were spilled. However, the spill was quickly detected and reportedly contained, and the waste oil/water mixture was disposed of by a hazardous waste hauler licensed by the state. No analytical documentation could be located for this incident.

3.4.4 AAFES Underground Storage Tank Failures at Building 231

Previous investigations[9] of this spill incident are discussed fully in Appendix A. A brief summary of the important findings is as follows. Four gasoline tanks that had failed leak tests were removed from under asphalt pavement north of the Automotive

Service Station in November 1988. A certain amount of fuel-contaminated soil was also removed from the vicinity of the tank excavations. However, soil and groundwater monitoring in the expected downgradient direction (north) revealed additional contaminated soils. Reportedly, PSF is awaiting funding to remove this additional contaminated soil (estimated at 1,000 yd^3). The monitoring wells could not be found during the ANL site visit; however, USATHAMA has reported locating these wells during a subsequent site visit.

These four tanks, each with a 10,000-gallon capacity, are believed to have been installed when the service station was constructed in 1950.

3.4.5 PCB Spill at Building 1040

Previous investigations[41] of this PCB release are summarized in Appendix A. In 1987, analysis of a leaking transformer and the concrete pad on which it was mounted revealed PCB concentrations above 50 parts per million (ppm) in some areas of the pad. Furthermore, PCB concentrations increased with depth of samples taken from the concrete pad, leading the investigators to conclude that soil underlying the pad may also be contaminated with the PCBs.

No remedial actions have yet been initiated. The transformer continues in service (still exhibiting a minor dielectric fluid leak), and no further investigations have been conducted. Reportedly, PSF officials are awaiting funding to remove the transformer and remediate the area.

3.5 REFRIGERATION AND COLD STORAGE[2]

The cold storage and refrigeration operations on PSF are complex and varied. Some disciplines require ultra-load refrigeration temperatures, while others do not. As a result, refrigerants used at PSF often must be specially blended. The refrigerants are known by their formulation names (e.g., Refrigerant 12, 22, 502, 113, 115). Refrigerant 12 contains the most toxic form of chlorofluorocarbon (CFC), namely dichlorodifluoromethane; Refrigerant 22 contains the least toxic form, chlorofluoromethane. All formulations are commonly known as Freons.

Until a new and proven-safe product is found, CFC will continue to be the chief component in Freon. Ideally, the least toxic of the CFCs (Refrigerant 22) should be used exclusively at PSF. However, there are many types of refrigeration systems at PSF, and each is a sealed unit. Compressors, evaporators and other hardware used in each separate system are "refrigerant-specific." It is therefore not energy-efficient to interchange or substitute refrigerants without total system conversion.

Sizable amounts of CFCs are consumed to keep the refrigeration systems in working condition. According to knowledgeable PSF personnel, approximately 300 to 500 pounds per month (lb/mo) of CFC are used. PSF personnel also report that the equivalent of a 120-lb tank of CFC escapes to the atmosphere per month either as a result of leaks or as a result of "system dumping" due to malfunctions. These losses are said to reflect normal refrigeration system operations.

3.6 ASBESTOS

Construction records indicate that many buildings at the installation have corrugated asbestos panels in their structures. (See Sec. 2.2 for a description of some PSF buildings known to contain asbestos.) A comprehensive asbestos survey of all PSF buildings is ongoing. The results of that study are expected to be available in late 1989. At vehicle maintenance shops, asbestos is present in brake linings and is released to the atmosphere during brake and clutch servicing.

Substantial deterioration of asbestos boiler and pipe insulation has occurred in Bldg. 1802, the power plant of the Public Health Services Hospital. Presently, that area is posted for the airborne asbestos hazard, and all those entering the building are required to wear respiratory protection. This situation does not constitute a release to the environment, however, since the problems of airborne asbestos are confined to the inside of the building. Asbestos is also reported to have been extensively used in other PHSH buildings.

It was reported by USAEHA that asbestos insulation removed from various PSF buildings in the past was disposed by landfilling somewhere on PSF.[8] However, the locations of such disposal sites and additional specific information about such activities were not provided, and PSF officials could not corroborate this USAEHA statement.

Finally, it has been reported that asbestos possibly contained in buildings previously demolished would not have been removed prior to demolition and was instead buried with the demolition debris at many PSF locations, especially the LAIR/LAMC area. (See Sec. 3.11 for additional discussions on possible asbestos burial at PSF.)

3.7 ABOVE-GROUND FUEL STORAGE TANKS

Currently, there are at least 22 reported above-ground fuel storage tanks at PSF (see Table 3-1). Installation dates and other specific information about many of the tanks are not well documented and largely unknown. The above-ground tank behind Bldg. 268 is very heavily stained, as is the concrete berm in which it is located. Staining of soils adjacent to the concrete berm was also observed. However, the majority of leaked (or possibly spilled) oil appears to have been contained within the concrete berm. The exact nature and quantity of the material currently in the tank is unknown. The tank had formerly been used to store mixtures of waste oils, degreasing solvents, and paint thinners.

There are also several above-ground gasoline and diesel fuel storage tanks around Bldg. 637. The extent of contamination of the underlying soil and pavement has not yet been determined, but some staining was observed.

Above- and below-ground fuel storage tanks are located at Bldg. 624, in the Consolidated Motor Pool area. Tanks in this area store gasoline or diesel fuel for gas station and motor pool use and heating oil for family housing and barracks. Inspection of this area was not possible during the site visit. At least six above-ground tanks are

visible at the Consolidated Motor Pool facility. However, since an exact number of tanks at this facility could not be established with facility personnel, none of these tanks is listed in Table 3-1.

3.8 UNDERGROUND STORAGE TANKS

Currently, PSF records indicate that there are more than 200 underground storage tanks (USTs) on PSF. A complete listing of all known USTs appears in Appendix G. Figure 3-3 shows the locations of all USTs listed in Appendix G. Salient information on PSF underground tanks is summarized below:

- Tanks are recognized by their building numbers.
- Installation dates, leak-detection equipment, and information on secondary containment systems for most of the tanks are unknown.
- Unless otherwise noted, all these tanks contain either oil or oil residue.
- Reportedly, many storage tanks (especially small tanks holding heating fuel) were abandoned in place. However, no further information on their decommissioning is available.
- Most buildings in the housing, barracks, and parade ground areas are associated with USTs that once held heating fuel.
- Only a few tanks have been leak-tested. (PSF officials

TABLE 3-1 Above-Ground Fuel Storage Tanks at PSF[a,b]

Bldg.	Size (gal)	Content	Status
268	200	Diesel	U
288	10,000	Oil	U
304	106,092	Fuel oil	A
637-1	275	Oil	U
637-2	5,000	Gasoline	U
637-3	5,000	Gasoline	U
637-4	5,000	Gasoline	U
637-5	20,000	Gasoline	U
637-6	20,000	Gasoline	U
637-7	20,000	Gasoline	U
638	275	Oil	U
924-1	U	Bulk oil	C
924-2	400	Waste oil	C
970	424,000	Gasoline	A
979-1	5,500	Gasoline	A
979-2	1,000	Gasoline	A
979-3	5,000	Gasoline	A
1088	20,000	Oil	C
1260	15,000	Fuel oil	D
1349	105,760	Fuel oil	U
1351	1,000	Waste oil	C
1356	20,000	Fuel oil	A

[a]A: abandoned
U: unknown
D: drained
C: currently used

[b]This list was compiled from information reported by a variety of PSF personnel familiar with the various listed facilities and buildings. No documentation on these tanks could be located, but the existance of many of them was corroborated by ANL team observations.

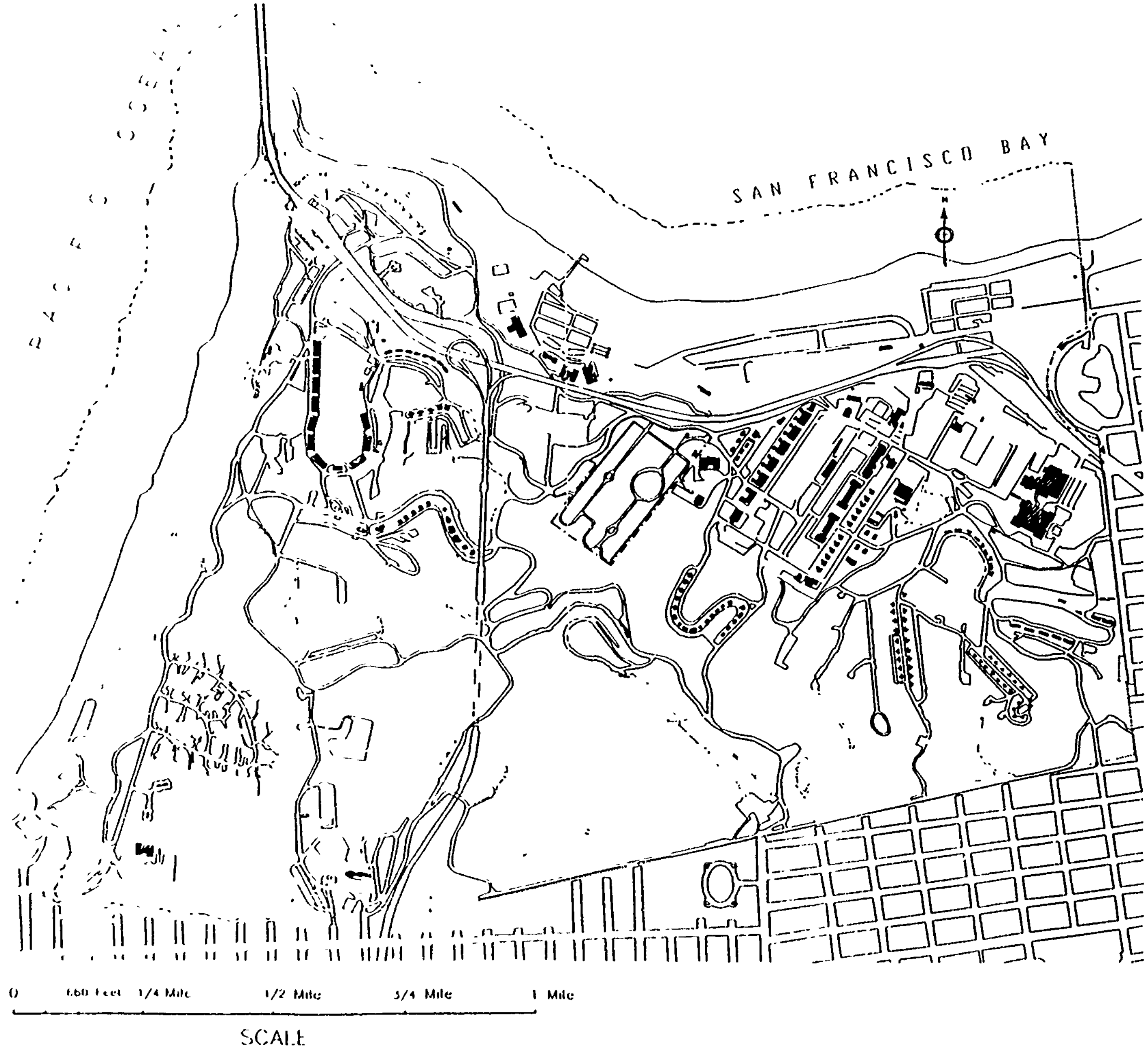


FIGURE 3-3 UST Locations as Listed in Appendix G

reported that only the four tanks at the AAFES service station [Bldg. 231] and the three tanks at the AAFES gasoline station [Bldg. 207] have been leak-tested. The four tanks at Bldg. 231 failed the test and have since been removed [see Sec. 3.4.4 and Appendix A]. The tanks at Bldg. 207 passed the test and are currently in service.)

- Of the 15 known 100-gallon USTs scattered throughout the installation, only one (Bldg. 38) is currently in use.

- There are 11 known tanks with capacities between 275 and 500 gallons, all generally used to store fuels for generators and other equipment. Two tanks in this size range are used to store waste oils (Bldgs. 231 and 979).

- Of the 13 known tanks with capacities of 1,000 gallons or larger, three are used to store vehicle fuels (Bldgs. 975, 979, and 1027); seven are used to store generator fuels (Bldgs. 1100, 1110[2], 1800[3], and 1802); two are used to store heating fuels (Bldgs. 750 and 1040); and one is used to store pesticide rinsate wastes (Bldg. 269).

Additional important information on particular USTs at the PSF appears below:

- Prior to construction of the present Burger King Restaurant (Bldg. 210), two leaking underground gasoline storage tanks were removed from the area. Some contaminated soil was also removed. Additional testing of the area is needed to identify total contamination. PSF personnel report that a subsurface bacteriological clean-up program is planned for trial in this area.

- At the AAFES service station (Bldg. 231), four leaking underground gasoline storage tanks were removed in 1988. Approximately 700 cubic yards (yd^3) of petroleum contaminated soil were also removed. It is estimated that an additional 1,000 yd^3 of soil are contaminated and require treatment or removal.

- There are reportedly two USTs adjacent to the vehicle maintenance shop (Bldg. 937). One tank reportedly stored xylene solvent and has not been used in 35 years. The second tank had been used to store waste oils, solvents, and paint thinners. Either or both of these tanks may have contributed to significant groundwater contamination discovered in 1981 in this area (see Appendix A).

- There is only one documented septic tank and leaching field existing at PSF. It serves a golf course latrine (Bldg. 465), has a 1,000 gallon capacity, and is 12 years old. The tank appears to be functioning properly and is not considered a source of groundwater contamination.[24]

In addition to the known underground tanks listed in Appendix G, circumstantial and hearsay information suggests that additional underground tanks may still be present. Table 3-2 lists these unconfirmed but probable tanks.

In March 1987, PSF officials had developed an inventory of USTs in compliance with state and federal regulations. However, none of the tanks listed in that inventory is identified as to location; consequently, reconciliation of that information with the information listed in Appendix G is not possible. The March 1987 inventory has not been up-dated to reflect recent tank removals. Nevertheless, the "official" PSF UST inventory is included in Appendix H. PSF officials have also provided a map showing the general locations of registered USTs (see Fig. 3-4).

3.9 POLYCHLORINATED BIPHENYLS

Until recently, PCBs were used extensively in a wide variety of manufactured products including transformers, capacitors, hydraulic fluids, plasticizers, adhesives, pesticide extenders, inks, lubricants, cutting oils, heat-transfer systems, surface coatings (for wood, metal, and concrete), fluorescent light ballasts, caulking material, paints, fire retardants, and insulated wires and cables. Similar to the chlorinated hydrocarbon pesticides, PCBs are toxic, highly stable, and accumulate in the environment and in the food chain.

TABLE 3-2 Unconfirmed but Probable Underground Storage Tanks[a,b]

Building 207; one 400,000-gallon tank (unknown material stored)
Building 217, old gas station; four 4,700-gallon fuel tanks
Building 231, old gas station; two 2,000-gallon fuel tanks
Building 601, old gas station; two 10,000-gallon fuel tanks
Building 616; one 4,000-gallon tank (unknown material stored)
Building 621; one 15,000-gallon tank (unknown material stored)
Building 624, old gasoline pump house; (now used for oil storage)
Building 626; one 6,000 gallon-gasoline tank
Building 929, old gasoline pump house for Crissy Field; one 10,000-gallon tank (unknown material stored)
Building 933, former boilerhouse for Crissy Field
Building 1801, Letterman boiler house; 20,000-gallon fuel oil tank

[a] In addition to the tanks listed for these locations in App. G.

[b] This list was compiled from information reported by a variety of PSF personnel familiar with the various listed facilities and buildings. No documentation on any of these tanks could be located, however.

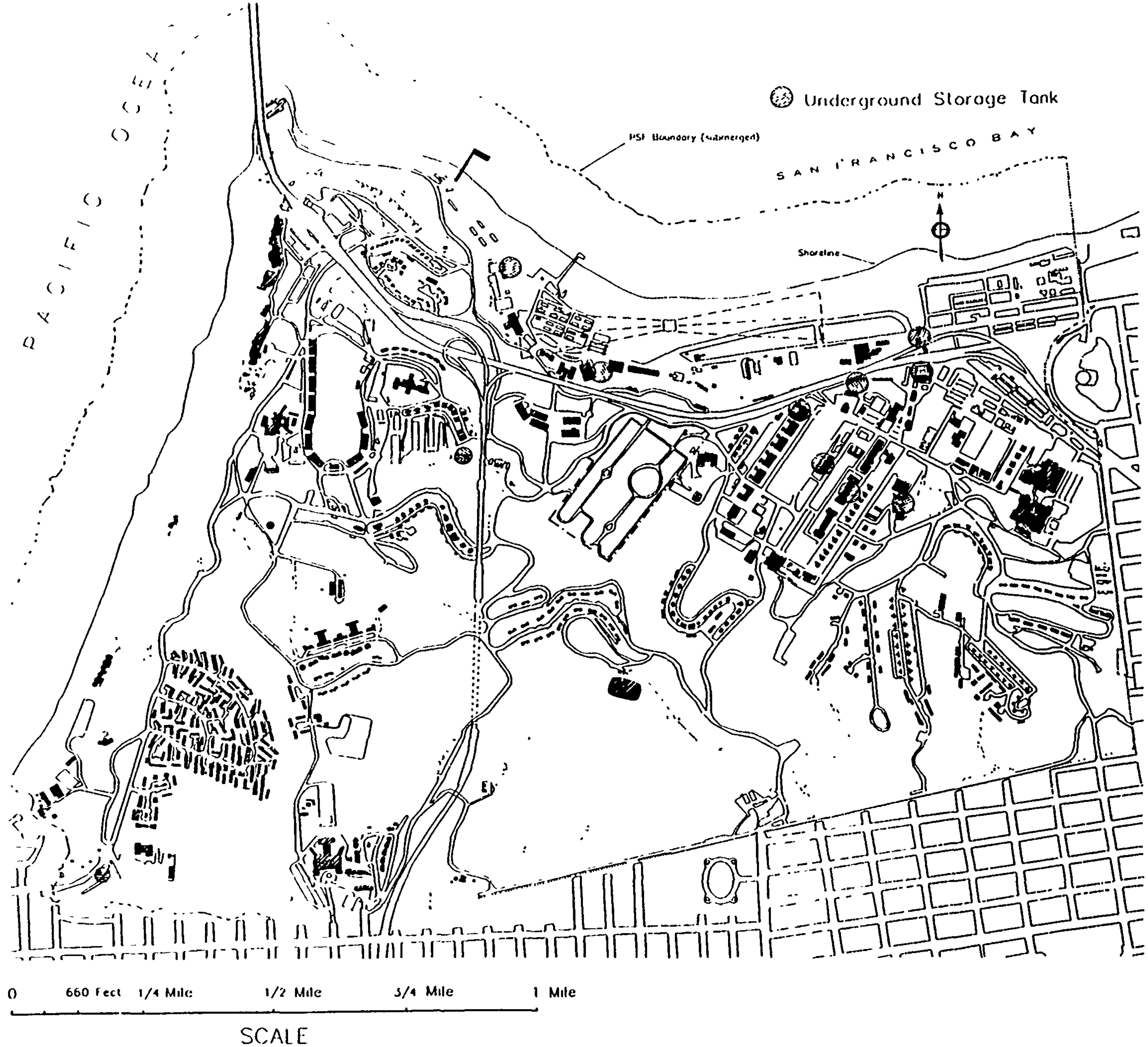


FIGURE 3-4 Registered Underground Storage Tanks at PSF

In March 1986 an industrial hygiene study was performed at PSF to determine whether Bldg. 564, and the adjacent Bldgs. 566 and 567, had been contaminated with PCBs, PCDDs (polychlorinated dibenzo-p-dioxins), and PCDFs (polychlorinated dibenzofurans).[49] On February 18, 1986, one of three identical electric transformers (serial #8811967) in Bldg. 564 short-circuited, and the transformer oil was ignited and burned.[49] The study was performed because of concerns by installation personnel that the transformer oil might contain PCBs and ingredients that could have produced PCDDs and PCDFs as products of combustion. The industrial hygiene study found no PCBs or PCB combustion products in concentrations requiring removal or remedial action on the structures or surrounding areas.

Leaking or unservicable transformers awaiting PCB test results are stored in a secured, enclosed, concrete-bermed and -floored structure near the electrical substation (Bldg. 680). The transformer status is recorded on wire-fastened cardboard labels. Transformers waiting to be put back in service are stored outside. Reports indicate that the weather-exposed tags ~~were~~ difficult to read and some were missing. Transformers exceeding the disposal PCB concentration limit are removed by an HW contractor.[2] ANL investigators also observed three old transformers, which had not been tested, abandoned in the back yard of shop Bldg. 924, as well as crated and uncrated new transformers in the DEH storage yard at Bldg. 979. Three new surplus transformers were also observed outside Bldg. 285.

There is a report of a transformer adjacent to Bldg. 1040 leaking PCBs and requiring removal.[41] The transformer leakage has contaminated a concrete slab and possibly some underlying soil. It is estimated that several cubic yards of concrete and soil will have to be removed and disposed of properly.[48] (Reports of PCB sampling at Bldgs. 680, 1040, and 1151 are discussed in Appendix A.)

Reports indicate that additional buildings on site at one time contained transformers. Buildings 927 and 611 were previously transformer vaults. Documentation on previous transformer inventories and spill incidents (if any) are not available for these buildings.

According to an inspection conducted on July 27, 1989, by PSF personnel, there are currently three PCB-containing transformers in service at PSF, which are described as follows.

Location	Manufacture	Dielectric Fluid	Determination of PCB
Bldg. 1040	Wagner	98-(Noflamol)	Label
Bldg. 648	Wagner	100-(Noflamol)	Label
Bldg. 657	Hevi Duty	30-(Assumed)	Assumed

The transformer at Bldg. 1040 leaks at the temperature gauge. The one at Bldg. 648 has no leaks. The transformer at Bldg. 657 is a 5-kVa constant current regulator, but its leak status is not addressed in the inspection report.

The installation-wide assessment of PSF performed for USATHAMA in October 1983 noted minor PCB leaks from transformers located inside Bldg. 220 and on a pad adjacent to Bldg. 649. In both instances, these leaks did not result in migration of PCBs into the environment. PSF has successfully cleaned up and removed all PCB contamination at these two buildings.[3]

3.10 PSF NIKE MISSILE INSTALLATIONS[2,3,12,13]

Maintaining Nike missiles in a state of combat readiness required the storage and use of a variety of missile components as well as fuels, solvents, hydraulic fluids, and paints. Each missile was on a routine maintenance program, which required partial dismantling and reassembly at the Nike site. Besides this routine maintenance, a percentage of missiles from each battalion were completely disassembled and shipped to a central depot annually for more extensive maintenance and re-calibration. In addition to maintenance activities, readiness drills included fueling and arming the missile. Together, routine maintenance activities and readiness drills represent the largest probable source of waste materials.

Potential areas of contamination at the missile-launch sites included:

- Missile assembly, drainage and seepage systems
- Diesel and fuel oil storage systems (including both above- and below-ground tanks)
- Magazine seepage systems
- Warhead arming area drainage systems
- Missile fueling area drainage systems
- Motor pool maintenance area
- Infiltration wells for liquids disposal
- On-site landfills
- Septic systems
- Unofficial, conveniently located disposal areas.

Potential areas of contamination at the fire-control sites included:

- Motor pool maintenance areas
- Septic systems

- Diesel, fuel oil, and gasoline storage systems (including both above- and below-ground tanks)

- On-site landfills

- Unofficial, conveniently located disposal areas.

Of the two (and sometimes three) areas comprising a battery, the launcher area is expected to represent the greater potential for environmental contamination. Normally encountered wastes included benzene, carbon tetrachloride, chromium and lead (contained in paints and protective coatings), petroleum hydrocarbons, perchloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, and trichloroethylene (TCE). This list does not represent the complete array of hazardous materials present at a Nike battery, but rather includes those chemicals used in substantial quantities which are expected to have environmental persistence.

Rocket fuels such as unsymmetrical dimethyl hydrazine, and initiators such as inhibited red-fuming nitric acid, were also present in substantial quantities at launcher areas, but their inherent chemical reactivities suggest that their possible release presents no long-term environmental threats.

Explosives contained in warheads, especially the Hercules nuclear warheads, were strictly controlled for reasons of both personnel safety and national security. Furthermore, major maintenance of warheads was performed at the arsenals where they were originally assembled and not at the launcher sites. Therefore, the Nike missile launch site is not expected to have been the point of purposeful release or disposal of any warhead-related materials.

Deactivation of the Nike batteries, inferred largely from field manuals and directives, involved the removal of all missile components, warheads, and rocket fuels and initiators, although on-site disposal of some minor amounts of these chemicals may have occurred. Deactivation also involved the dismantling of radar and communication towers and the removal of all electronic equipment and power generating equipment such as generators and transformers. Fuel tanks supplying the power generators and buried electrical and communication cables were normally not removed.

Electronic equipment associated with missile firing (located in the underground missile storage magazines) was normally removed, but the hydraulic systems (including hydraulic fluids) for the missile elevators were normally left in place.

Fuel tanks were normally drained, but the tanks were not removed. Concrete foundations for radar towers and mobile equipment vans were left in place, as were drain tiles, septic systems, dry wells, or other infiltration basins which may have been present.

Generic deactivation plans normally did not provide specific directives or officially established opportunities for disposal of related chemicals (outside of rocket fuels, warhead explosives, and vehicle fuels), leading to the speculation that chemical disposal was accomplished through the most convenient means available and at the battery commander's discretion. This may have included on-site disposal in landfills or

infiltration basins, disposal in local landfills, or simply discharging materials onto the ground or into nearby ditches or watercourses. Such generic plans do not necessarily apply to PSF and no Nike facility waste disposal has been documented at PSF.

An installation assessment done in 1983 reported that no fuel, catalysts, acids, or other material associated with Nike installations were disposed of on the PSF.[3] The report also stated that Nike Battery 89L was paved over and used as a parking lot for recreational vehicles. However, through review of aerial photographs from 1959 and 1963 and the ANL visual inspection of the facilities at the former Nike battery, the facility appears to have been abandoned as it was, with little or no change to its basic structure. PSF officials have reported that Nike-related equipment is believed to be still present in the missile silos. Until the silos, which have been sealed, are examined, however, it cannot be firmly established whether the Nike equipment was left in place or removed. There were conflicting reports from various people with long-term associations with PSF as to the contents, if any, of these missile silos.

Although the original buildings associated with the Nike battery are currently occupied and maintained by 87th Ordnance, the actual property (within a fenced area) is not well kept. The paved areas of the site (above the silos) were littered with construction debris, abandoned cars, old tires, a few automotive batteries, heavy piping, and concrete. Heavy erosion of the pavement around two of the sewer grates was observed during the team visit. However, it is unclear whether this erosion was caused by rainfall drainage or whether it is indicative of liquid wastes being discharged to these sewers.

3.11 LANDFILLING OPERATIONS AT PSF

3.11.1 General Comments on PSF Landfilling[2]

There have been many landfilling operations at PSF over its history. These operations are largely undocumented, and for the most part they were conducted without benefit of waste-stream controls. No PSF landfill has ever operated under the control of a permit issued by federal, state, or local regulatory agencies. PSF officials report that all on-site landfilling ceased at PSF by 1981. (However, an independent study of hazardous waste-management activities at PSF has noted asbestos disposals may have occurred on PSF as late as 1983.[8]) (See Appendix A.) Landfills were closed without formal closure plans, and no post-closure monitoring has been performed at any of the closed landfill sites.

PSF landfills were not dedicated to wastes from any particular facility or activity, but rather served the general waste-disposal needs of the entire installation. One exception to this was the solid-waste landfilling which reportedly took place on the grounds of the Public Health Services Hospital, in the southwestern portion of PSF. Materials disposed in this fill are said to have come exclusively from hospital activities. (This landfill was operational during the period when the hospital was an independently run operation, and ceased operation before the hospital came under PSF's administrative control.)

PSF landfilling operations fall into two general categories: filling with clean fill materials and/or building demolition debris, and disposal of various solid wastes. Of these two categories, the latter is generally expected to have the greater potential for adverse environmental impact.

Landfilling of building demolition debris or construction and demolition (C and D) wastes was often conducted without documentation, with many such landfilling operations discovered only years later as the result of subsequent construction or excavation activities in the areas previously filled. It is impossible to say conclusively that these operations involved only environmentally inert materials and therefore represent no environmental threat. In fact, such debris most likely contained asbestos. However, there have been no documented incidents of environmental problems associated with "C and D" or "clean fill" operations at PSF. Although subsidence problems have sometimes developed in these fill areas, such problems were attributed to poor placement and compaction techniques rather than to degradation of putrescible or biodegradable materials present in the fill.

With respect to solid-waste landfilling activities, these, too, have been quite numerous and largely undocumented. PSF personnel reported that, because there were no controls on waste inputs, solid-waste landfills were potentially the repositories of all wastes generated at PSF over the period when such landfills were operational. Although there were standard operating procedures in place for the various shops -- and although the SOPs required segregation and separate management of chemical wastes (waste oils and solvents) from other solid wastes -- compliance with such procedures is undocumented and not guaranteed. No waste-disposal activities reported by PSF personnel were included in this report unless independently corroborated by at least two individuals.

It is also important to note that PSF has been an "open post" over the majority of its history. It is therefore possible that any of the PSF landfills could have received wastes generated from off-post activities. Indeed, recent experiences at the current solid-waste transfer facility at PSF bear this possibility out. Procedures are in place for DEH personnel to periodically inspect the wastes left in the transfer-station waste containers and remove articles now prohibited from disposal in sanitary landfills. As a result of this procedure, DEH routinely removes inappropriate wastes for combination with PSF hazardous wastes being stored elsewhere on PSF for later removal to off-post hazardous waste treatment or disposal facilities. DEH personnel report that much of the waste thus removed does not appear to be of PSF, or even Army, origin; there is speculation that such wastes are being brought to the unattended transfer station from off-post. On the average, approximately 150 ft^3 of such materials (contained mostly in 1-gallon, 5-gallon, and occasionally 55-gallon containers) are removed by DEH from the transfer station on a monthly basis.

Currently, all solid wastes generated at PSF are hauled by the generating facilities to a central solid-waste transfer facility, where it is dumped into a number of open-top roll-off containers. The accumulated wastes are periodically removed for disposal at an off-site commercial landfill by Bay Cities Refuse, a local hauling contractor. This transfer facility is designated to receive only solid wastes and paper wastes. Each facility at PSF is responsible for segregating its wastes to ensure that

hazardous chemical wastes or special wastes are not delivered to the transfer facility. The transfer facility is unmanned and has no access-control features. The same private contractor also removes solid wastes from a number of dumpsters located throughout PSF for off-site disposal.

As noted above, DEH personnel routinely scavenge through deposited wastes and remove all articles which should not have been deposited in the transfer station. Those articles are later incorporated into the hazardous wastes being stored at DEH facilities awaiting removal to commercial off-site hazardous waste management facilities. Occasionally, drums or containers of wastes are discarded in the wooded hillsides surrounding the transfer facility. Overall, however, primarily because of the DEH policing efforts, this transfer facility does not appear to have a significant adverse impact on the environment.

Finally, aerial photographs and an interim report of PSF by the Environmental Photographic Interpretation Center of the Environmental Monitoring Systems Laboratory were recently provided to ANL by USATHAMA.[51] Aerial photographic analyses were performed on photographs dated July 26, 1946; October 1, 1959; September 1, 1963; April 22, 1973; and May 4, 1988. In many instances, these interpretations further corroborated the locations and operational periods of many of the landfilling activities reported by DEH personnel. Those instances of correlation are noted below in discussions of individual fill sites.

3.11.2 Known Landfilling Areas on PSF

DEH personnel have identified 10 landfilling areas at PSF. Each is described below, and their approximate locations are displayed in Fig. 3-5. The existence and locations of each of the landfilling areas described below have been corroborated by independent testimony of PSF personnel. In some instances, those providing information on waste-disposal activities were eye witnesses to, or participants in, those activities.

Figure 3-6 shows the approximate locations of the landfills in relation to the geologic units presented previously in Fig. 2-8. Additionally, some PSF buildings are also included for reference. It should be noted, however, that these landfill locations are approximate.

Landfill Area #1

This area has been used in recent years for disposal of tree stumps, landscape wastes, storm damage, and some building rubble. No other solid or hazardous wastes are known to have been deposited in this location. The location correlates well with area identified in 1973 and 1988 photographs as a disturbed area (DA #13). No adverse environmental impacts from this fill are suspected.

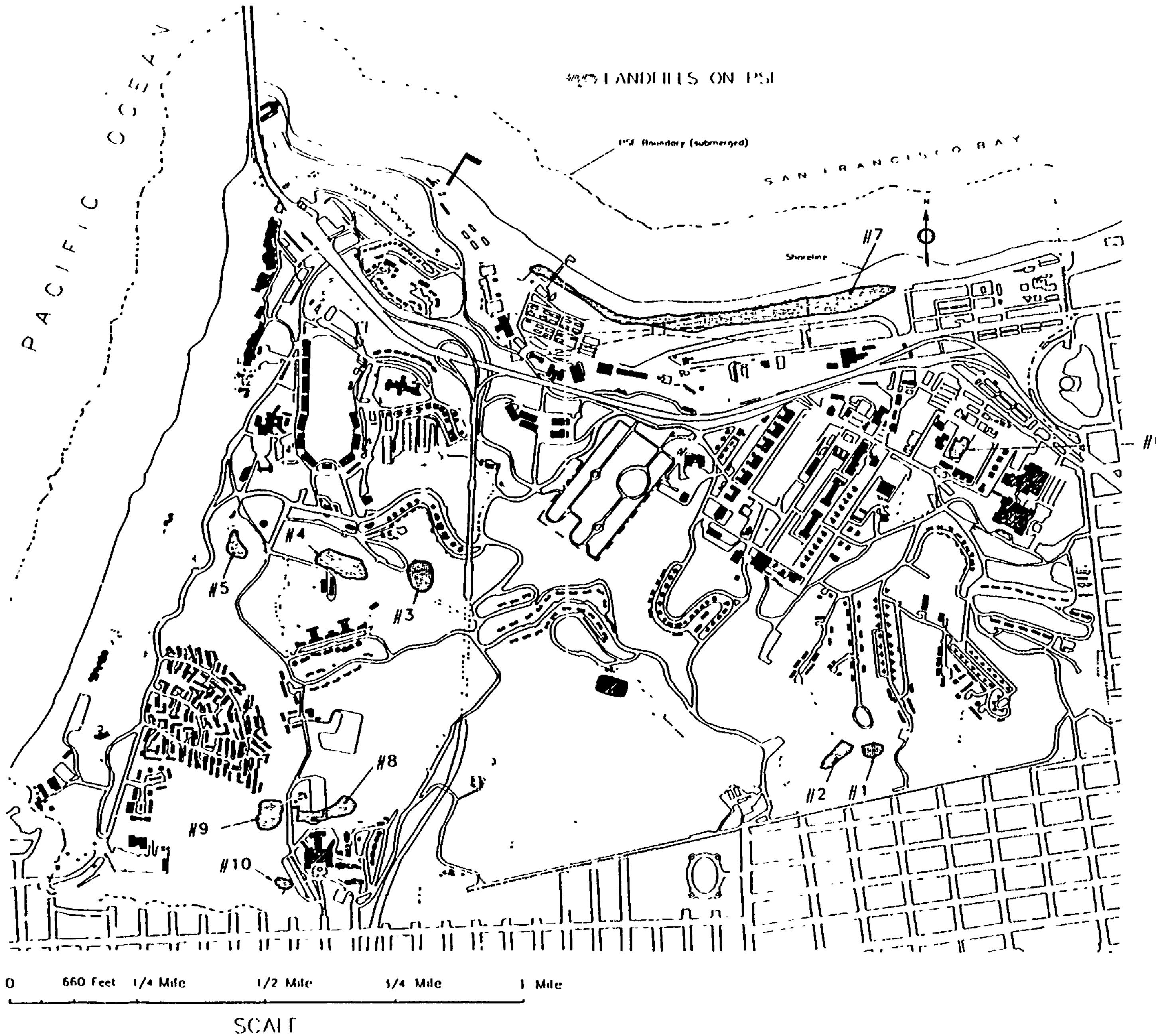


FIGURE 3-5 Approximate Locations of 10 Landfills, PSF

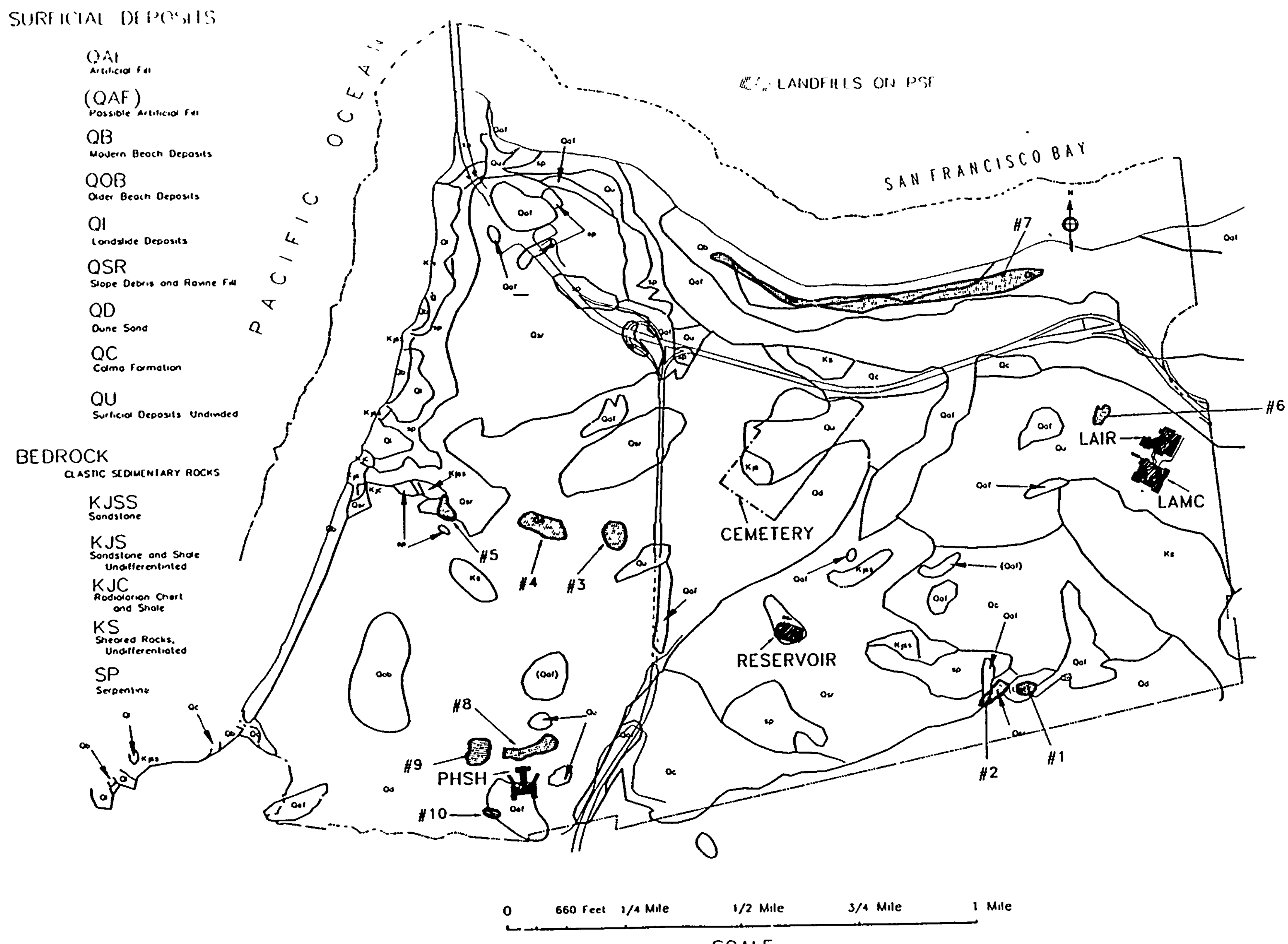


FIGURE 3-6 Landfills on PSF Displayed with Geologic Units

Landfill Area #2

This area received clean fill in 1987. The approximate dimensions of the fill are 200 ft x 600 ft x 8 ft deep. No solid or hazardous wastes have been deposited in this area, but some concrete and rubble may have been introduced. This area may correlate with photographic identification of disturbed area (DA #7) in the aerial photographs. No adverse environmental impacts from this fill are suspected.

Landfill Area #3

This area is in current use as the solid-waste transfer facility for all of PSF. The facility, which has been operational for approximately six years, is approximately two acres in size and consists of a loading ramp against which are staged open roll-off containers. No wastes are intended to be disposed of in this location; however, spills of liquid wastes may have occurred throughout the period of its operation, as evidenced by empty containers (paint cans and unmarked drums) observed scattered throughout the wooded areas adjacent to the facility. Hazardous wastes and otherwise inappropriate materials are routinely removed from the roll-off containers and temporarily stored on the ground in an adjacent area. This storage location has no provision for spill-containment, and the entire transfer facility has no access control.

Landfill Area #4

This area was the most recently used area for on-site disposal of solid wastes, having been closed by PSF in 1981. The top of the fill area is adjacent to the main ammunition storage bunker. The foot of the fill lies immediately upgradient of the Post Commander's house. Wastes were simply dumped over the original steep hillside and covered periodically with fill dirt. A 3-ft cap (approximate) was added as a final cover when the landfill was closed. The hillside has been repopulated with indigenous vegetation, including grasses and trees. The landfill is believed to encompass approximately 5 acres, but exact areal boundaries are not known. Some portions of the landfill are said to contain as much as 14 feet of deposited wastes. No post-closure monitoring has been conducted on this site. No environmental problems have been identified as resulting from this landfilling operation; however, DEH personnel have indicated that this landfill potentially received a great variety of wastes, including chemical wastes generated at various PSF facilities.

Landfill Area #5

This area was used concurrently with landfill area #4 and served generally as the wet-weather disposal area. The area is crescent-shaped, approximately 3 acres in size. Access to this hillside disposal area is made easy during inclement weather by the existence of an adjacent, level, rocked area. This rocked area has historically been used to service the street cleaning equipment used at PSF and has also been the disposal site for collected street sweepings. Disposal methods here also involved dumping down a steep ravine and only periodic covering with soils. Mature trees growing at the base of

the fill (along Lincoln Blvd.) have sustained obvious damage, but this damage is thought to be more the result of the significant change of grade at the bases of these trees rather than the result of chemical contamination emanating from the fill. Like area #4, this area was closed in 1981. No post-closure monitoring has been conducted at this site. Aside from the distressed trees, no environmental damage has been attributed to this landfill.

Photographic interpretations provide some correlation to the above noted events and activities. The 1946 photograph identifies ground scarring, a possible fill area, and the presence of a vertical tank in the approximate area of landfill area #5. The ground scarring may be associated with the rock placed in the area used to service the street cleaners.

Landfill Area #6

This area is now a paved parking lot. Construction in preparation for the parking lot revealed building rubble. Reportedly, when the buildings which comprised the original LAMC complex were razed in 1975, the resulting debris was disposed of in this area. There are no reports of hazardous constituents being placed in this fill area, although asbestos is expected to be present in the building debris.

Landfill Area #7

Reportedly, this fill area extends along almost the entire length of the old Crissy Field complex. The fill area shown in Fig. 3-5 is approximate and, without additional study detailing the exact areal extent of this fill area, it is impossible to determine whether this area is under Army or GGNRA jurisdiction. It appears that the majority of this fill area is on land under GGNRA control, but the northwesternmost extension of the fill may extend to Army-controlled areas. Crissy Field itself is said to have been built on fill, although the source of this fill is uncertain. Some maintain that the area was filled with bottom muds and sediments dredged from San Francisco Bay in preparation for the 1915 Panama Exhibit, while others suggest that the area was used for disposal of debris resulting from the 1906 earthquake. In either case, PSF personnel report that well after the initial landfilling under Crissy Field was completed, additional solid-waste disposals occurred along the shoreline adjacent to the main landing strip for Crissy Field. It has also been reported by long-term PSF employees that waste oils and solvents derived from maintenance activities associated first with the seaplane servicing activities at Crissy Field, and later with the vehicle maintenance shops operating out of buildings at Crissy Field, were possibly discharged along this shoreline area.

Photographic correlation of disposal activities in this area is especially good. The 1946, 1959, 1963 and 1973 photographs all indicate this area as one receiving mounded material and debris. Both the 1963 and 1973 photographs show the area as disturbed (DA #4). The 1973 photograph further identifies a probable outfall as occurring over a long portion of the shoreline coinciding in location with the reported disposal area for maintenance shop-related wastes. However, the identified outfall may also be a storm drainage outlet and not associated with disposal activities.

Landfill Area #8

This landfill is thought to have been for the exclusive use of the Public Health Services Hospital. Although no records of its operation exist, it is reasonable to assume that the fill site received building debris from the original hospital complex of buildings (the old U.S. Marine Hospital), which were razed in the 1930s. In addition, it is likely that this fill area received all wastes generated as a result of hospital activities, including ash from the hospital's incinerator, laboratory animal carcasses (which may have been infectious), tissue samples resulting from pathology operations, and all other miscellaneous hospital trash. Finally, the westernmost area of this fill may encompass, or at least adjoin, an area said to have at one time been used as a cemetery for burial of sailors treated at the Marine Hospital. Much of this cemetery is believed now to be located under the paved parking lot and tennis courts north of the existing hospital building complex.

Photographic interpretations provide good corroboration of some of the activities said to have occurred at this fill site. The 1946 photo shows no disturbance of this area, and it cannot corroborate disposals of building debris that may have occurred earlier. However, the area is identified as a "disturbed area" in the 1959, 1963, and 1973 photographs (DA #8). The 1973 photograph also indicates revegetation of the area.

Landfill Area #9

This is a recent (1988) filling operation, conducted to prepare the area for eventual use as a soccer field. Reportedly, only clean fill and some building rubble was deposited in this area. No adverse environmental impacts are expected from this site.

Landfill Area #10

This is a small landfilling activity designed to extend the existing hospital parking area to the west, thereby allowing for the construction of a helicopter landing pad. Although small in areal extent (approximately 20 ft by 30 ft), this fill is quite deep, extending down the side of a steep hill (greater than 20% slope). Reportedly, only building rubble and clean fill were placed here. This is likely to be the case, given the engineering stability and strength requirements of the helicopter pad. Indeed, building rubble (bricks and mortar) can be seen protruding from the hillside below the helicopter pad. Although this fill may contain asbestos, no adverse environmental impacts will result if it remains undisturbed.

3.11.3 Possible Disposal/Discharge Areas on PSF

A number of other areas at the PSF have been interpreted from aerial photographs as being possible sites of landfilling activities or areas where discharges to the ground surface may have occurred. None of these areas has been identified by PSF personnel as formally designated solid-waste disposal areas, however. Nonetheless, independent evaluations of aerial photographs suggest that these areas are possible or

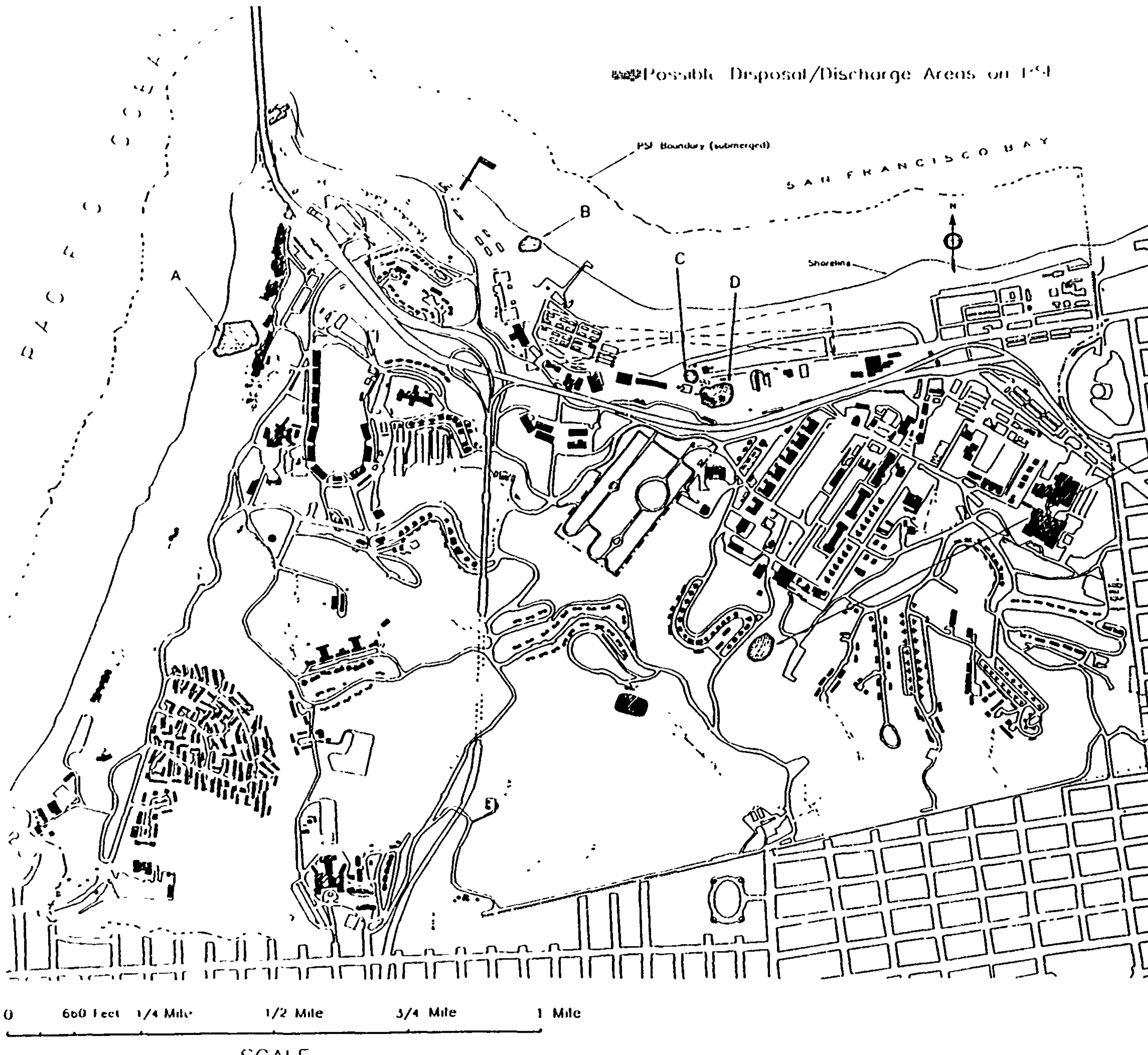


FIGURE 3-7 Possible Disposal/Discharge Areas, PSF

probable disturbed areas, areas where ground staining or ground scarring has occurred, or where debris (unspecified) or other material has been piled or mounded. Figure 3-7 gives the approximate locations of each of these possible landfilling or surface discharge areas, which are discussed below. Only those areas identified on at least two photographs have been included in this discussion.

Possible Disposal/Discharge Area A

First occurring in the 1946 photograph, this area is identified as a debris-disposal and disturbed area (DA #1). These conditions persisted until 1973, when the photograph shows possible cover materials and the beginnings of revegetation. The 1988 photograph shows no further disturbance in this area, with the revegetation completed. There is no other evidence linking this area to solid-waste disposal activities. PSF personnel have noted that, in the past, the general public discarded solid waste and household trash down the steep embankment leading to the beach in this approximate area. The area appears to be on the strip of shoreline along the Pacific Ocean under GGNRA jurisdiction.

Possible Disposal/Discharge Area B

A probable outfall (into San Francisco Bay) was identified directly north of Bldg. 937 in the 1946, 1959, 1963, 1973, and 1988 photographs. This outfall may represent a drainage outlet from the storm drains serving the large paved areas around the maintenance shops at Crissy Field. Given the ground staining also reported in this shop area in the 1946, 1959 and 1988 photographs, this outfall may, from time to time, have contained petroleum products washed away by surface drainage of the paved areas.

Possible Disposal/Discharge Area C

This is a ground area adjacent to Bldg. 640, the central motor pool. Ground staining of significant proportion is identified in the 1959 and 1963 photographs in an area immediately north of Bldg. 640. The 1973 photograph shows that new cement pavement had been installed over the same area previously stained.

Possible Disposal/Discharge Area D

This area is the central POL facility (Bldg. 637), comprised of six vertical fuel-storage tanks. The 1946 photograph, which predates construction of the POL facility, shows only one horizontal tank (apparently a predecessor to the vertical tanks). However, the 1953, 1963, and 1973 photographs all show ground staining in the vicinity of the vertical tanks. The 1988 photograph shows no such staining.

Possible Disposal/Discharge Area E

The area showed disturbance (DA #6), debris piles, and filling in the 1946, 1959, and 1973 photographs. These activities all appear for the most part to have been

associated with the construction of a baseball diamond (Bldgs. 805 and 806). The playing field was completed by 1959, but the 1973 photograph shows that filling beyond the left field fence of the diamond appears to have continued. There is no corroborating documented or hearsay evidence identifying this fill area as having received solid or hazardous wastes.

3.12 LETTERMAN ARMY MEDICAL CENTER (LAMC)[2,3]

The wastes generated at the hospital fall into several categories: solid municipal (garbage), chemical, radiological, infectious and pathological, and silver from X-ray and photograph processes. Solid municipal wastes are handled through the general PSF waste management contract for off-site disposal and are not considered hazardous. Therefore, they will not be discussed further.

Those wastes identified as hazardous are essentially all generated in three primary areas: pathology, clinical investigations, and veterinary lab services. The hazardous chemical wastes consist primarily of solvents and alcohols and are manifested and removed by a contractor service. Typically, more new product of a hazardous nature is stored at the LAMC than is generated as waste. These chemicals are usually stored in containers less than 5 gallons in size in a hazardous-materials storage area located in the hospital's main building.

Under the authority of the NRC, the LAMC holds a license for the use of radiological materials. This license also extends to the use of similar materials at the LAIR (see Sec. 2.6). These wastes are collected and stored at the LAIR facility until ultimate removal by a private contractor and disposal at an approved burial site arranged for by the AMCCOM. Wastes containing radioisotopes having short half-lives are held for decay on the shelf until they are considered safe, then disposed of as municipal waste. Liquid wastes of a similar nature are discharged into the sanitary sewer system after a sufficient time for decay to *de minimus* levels.

Infectious and pathological wastes are collected separately from general refuse, appropriately bagged, autoclaved, and then disposed of in the general refuse. The autoclave is located behind the hospital building and is operated daily. Autoclaving is typically done in the early evening in order to minimize problems associated with odor.

X-ray and photographic fixative solutions from the LAMC and the dental clinic are turned into the DRMO in Alameda, Calif, for silver recovery. In addition, protective lead foil linings from the X-ray film are collected and turned over to the Logistics Division for recovery. (Silver recovery, previously practiced at the LAMC, has been discontinued.)

Currently there is no spill-contingency plan in place for the LAMC. In general, the officer in charge of hazardous materials storage and disposal is responsible for responding in the case of spills larger than 55 gallons of material. In cases where the spill is small (usually less than 5 gallons), individuals in the affected laboratory are responsible for the cleanup and disposal of spill debris. No documented problems with the LAMC waste-management could be located.

3.13 LETTERMAN ARMY INSTITUTE OF RESEARCH (LAIR)[2,3]

Research activity at the LAIR is supported by analytical chemistry, animal resources, surgery, pathology, radioisotope, and toxicology services. A Hazardous Communication Program had been recently implemented and a recent inventory of hazardous materials was developed for the LAIR laboratory operations. This inventory can be found in Appendix K.

A 1983 Installation Assessment performed for USATHAMA by Environmental Science and Engineering, Inc. reported that over-age chemicals and waste solvents are collected at the site of generation, manifested, and disposed of by private contractors.[3] Currently, such wastes generated at the LAIR are combined with similar wastes generated at the LAMC and sent to the DRMO at Alameda, Calif., for disposal.

Radiological wastes from both LAMC and LAIR operations are collected at the Radioisotope Service Group within LAIR, packaged in drums, and stored at LAIR until their removal and final disposal at a burial site in Richland, Wash.[3] Following procedures similar to those at the LAMC, LAIR personnel hold short-lived isotopes for decay on the shelf until they are considered safe and then disposes of them as municipal waste. Liquid wastes of a similar nature are discharged to the sanitary sewer system when they have decayed to *de minimus* levels; this action is considered safe from a radiological perspective.

Pathological and infectious wastes are incinerated, and any photographic and/or X-ray fixative solutions are shipped off-site with LAMC wastes for silver recovery.

Currently there is no spill-contingency plan in place for the LAIR. The PSF Fire Department responds to LAIR's needs with respect to spill containment and cleanup. According to LAIR officials, no significant LAIR spills or releases have been documented.

4 KNOWN AND SUSPECTED RELEASES

This section discusses all known or documented and suspected releases of contaminants to the groundwater, surface waters, soils, or atmosphere resulting from continuing facility activities as well as accidental releases or spills at the PSF. For each environmental medium, known or documented releases are listed first, then suspected releases. For the purpose of this section, "known" or "documented" releases are those supported by analytical results or by well corroborated observations (e.g., observing contaminated soils during excavation of leaking underground storage tanks).

4.1 RELEASES TO GROUNDWATER

4.1.1 Known Releases to Groundwater

- Release of petroleum hydrocarbons (estimated at 3,000 gallons) to the groundwater beneath Bldg. 937 and the surrounding hard-surface pavement, discovered in 1981 during excavation in the area. (See Secs. 2.2.1, 3.1.1, 3.4.2, 3.8, 4.3.1, and App. A.)

- Release of petroleum products to the groundwater beneath Bldg. 979 in 1982, resulting from an oil spill for which there was only partial recovery of spill products; no volume estimates of petroleum products still remaining in (above) the groundwater. (See Sec. 3.4.3.)

- Release of petroleum products to the groundwater beneath paved area adjacent to Bldg. 231 (Service Station), the result of leaking underground fuel storage tanks. (See Secs. 2.2.3, 3.4.4, 3.8, 4.3.1, and App. A.)

4.1.2 Suspected Releases to Groundwater

- Surface spills of petroleum products and other chemicals in the maintenance shops area and POL storage areas; such releases, when left unattended, may eventually percolate to groundwater, especially in the DEH and DOL maintenance areas, where groundwater is known to be near the surface. Of specific concern are 10 areas:

    1. Those around vehicle maintenance ramps adjacent to Bldg. 937. (See Secs. 2.2.1, 3.1.1, 3.4.2, 3.8, and 4.3.2.)

    2. Those around the filler pipe to a buried waste-oil tank adjacent to Bldg. 937. (See Secs. 2.2.1, 3.1.1, 3.4.2, 3.8, and 4.3.2.)

3. The drummed waste-storage area in Bldg. 950, a pole-design structure. (See Sec. 2.2.1.)

4. The drummed waste-storage area behind Bldg. 268, the DEH complex. (See Secs. 2.2.2 and 3.2.1.)

5. The spent-battery storage area adjacent to Bldg. 926. (See Secs. 3.1.1, 4.3.2, and App. A.)

6. The central POL facility (northwest of Bldg. 637), as suggested by aerial photographs; some petroleum spills are apparent, but others may now be covered by pavement. (See Sec. 3.7.)

7. The 10 identified on-site landfills and the possible leachates they generate. (See Fig. 3-4 and Sec. 3.12.)

8. Building 283, in and around which there is evidence of spills. (See Secs. 2.2.1, 3.1.1, 4.3.1, 4.3.2 and App. A.)

9. Building 640, the Consolidated Motor Pool, around which spills are suggested by aerial photographs (area may now be covered by concrete pavement).

10. Building 637, the central POL, with spills suggested by aerial photographs.

- Sanitary sewers at PSF which may, in some areas, be set below the highest water table elevations. (See App. A.)

- Leaking underground gasoline-storage tanks once located where Bldg. 210 (Burger King restaurant) now stands. (See Secs. 2.2.4, 3.8, and 4.3.1.)

- Buildings 285, 564, 566, 567, 611, 680, 924, 927, 979, 1040, and 1151 -- in or near which there may be spills or long-term leaks of PCB transformer fluids. (Groundwater contamination by PCBs is considered a very remote possibility, given soil's high attenuation of PCBs.) (See Secs. 3.4.5, 3.9, 4.3.1, and App. A.)

4.2 RELEASES TO SURFACE WATERS

4.2.1 Known Releases to Surface Waters

- Nonpoint exchanges between shallow groundwater under PSF and San Francisco Bay have been concluded from studies performed in

1986.[46] Thus, contamination of groundwater in the immediate vicinity of the Bay will ultimately result in contamination of surface waters in the Bay. (See Sec. 4.1.)

- Nonpoint runoff from adjacent hillsides has been established as the cause of high organic-carbon loading in Lobos Creek, and as eventually responsible for trihalomethane problems in the water-treatment plant. (See App. A.)

- Sanitary sewer backups and overflows to storm-drainage systems discharging to the bay, resulting from the failures of sewage-lift pumps and sewer clogging. (See App. A.)

- Intermittent wastewater discharges from the installation's wastewater-treatment plant to the Pacific Ocean, due to malfunctioning of the wastewater reclamation system. (See App. A.)

4.2.2 Suspected Releases to Surface Waters

- Heavy metal contamination from the flushing of sandblasting wastes into the storm-drainage system servicing the DOL maintenance area in the vicinity of Bldg. 937. (See Sec. 3.1.1.)

- Heavy metal contamination resulting from waste electrolyte being flushed from a spent-battery storage area adjacent to Bldg. 926. (See Sec. 3.1.1.)

- Reported pesticide and fertilizer runoff into Mountain Lake, ostensibly resulting from applications of those materials to golf course grounds.

- Possible releases to the bay from storm sewer outfalls in the vicinity of the DOL maintenance shops (in the vicinity of Bldg. 937), as interpreted from aerial photographs.

- Possible releases from alleged dumping along the shoreline adjacent to Crissy Field (landfill area #7, Sec. 3.12), resulting in an apparent outfall, as interpreted from aerial photographs.

4.3 RELEASES TO SOILS

Contaminated soils have been documented in a number of cases as the result of underground pipe or tank failures or leaks. Other instances of soil contamination are the probable result of continued small discharges and leaks at numerous maintenance shops and storage buildings or yards. Even those instances in which there have been such small

leaks and spills onto asphalt pavement or concrete surfaces, the spilled materials, if left unattended, may eventually permeate through or along cracks in the pavement to contaminate the soils underneath.

Another anticipated category of soil contamination is that resulting from the numerous underground storage tanks at PSF, some of which have been abandoned without documentation or testing for leaks, and many of which are still in service but have not ever been tested for integrity.

4.3.1 Known Releases to Soils

- Soils contaminated with petroleum products underly Bldg. 937 and surrounding paved areas as a result of pipe failures below the building discovered in 1981. (See Secs. 2.2.1, 3.1.1, 3.4.2, 3.8, 4.1.1, and App. A.)

- Soils contaminated with petroleum products underly paved surfaces to the north of Bldg. 231, a service station, as a result of leaking underground fuel storage tanks which were removed in 1988. (See Secs. 2.2.3, 3.4.4, 3.8, 4.1.1, and App. A.)

- Soils are known to be contaminated with PCBs (and other materials present in transformer dielectric fluids) in areas adjacent to Bldgs. 680, 1040, and 1151. Of these locations, Bldg. 1040 is expected to have the only significant accumulation of PCB in soils. (See Secs. 3.4.5, 3.9, 4.1, and App. A.)

- Soils contaminated with gasoline leaked from previously installed underground tanks may still be present in the area of Bldg. 210, the Burger King restaurant. (See Secs. 3.8 and 4.1.2.)

- A pesticide spill near Bldg. 609 in 1980 is known to have contaminated soils. However, the impact of this spill has been successfully mitigated, and all contaminated soils have been removed for proper disposal. (See Sec. 3.4.1.)

- Contaminated soils were observed in the outdoor waste-storage area at Bldg. 283 during a 1983 survey. Although waste storage no longer continues here, there is no record of decontamination being performed on the area. (See Secs. 2.2.1, 3.1.1, 4.1.2, and App. A.)

4.3.2 Suspected Releases to Soils

- Soil contaminated with petroleum products may exist under the concrete slab installed to the north of Bldg. 640, the Central Motor Pool, as interpreted from aerial photographs.

- Soil contaminated with petroleum products may exist below the paved area adjacent to Bldg. 637, the Central POL area, and Bldg. 638, as interpreted from aerial photographs.

- Soil contaminated with petroleum products and various other automotive maintenance-related materials and wastes probably exists under the paved areas adjacent to Bldg. 924 -- as the result of long-term open storage of materials and wastes without benefit of spill protection and of repeated spills and releases from those storage areas. (See Sec. 3.1.1.)

- Soil contaminated with petroleum products, paint products, and other automotive maintenance-related materials and wastes may exist under the paved areas adjacent to Bldg. 931. (See Sec. 2.2.2.)

- Soil contaminated with petroleum products, paint products, and other automotive maintenance-related materials and wastes may exist below paved areas adjacent to Bldg. 927. (See Secs. 3.1.1, 4.1.2, and App. A.)

- Soil contaminated with petroleum products and vehicle maintenance-related wastes is likely to exist under the pavement surrounding two vehicle-maintenance ramps (at Bldgs. 945 and 965) adjacent to Bldg. 937, the DOL vehicle-maintenance shop -- as evidenced by very heavy staining of the ground surface in this area. (See Secs. 2.2.1, 3.1.1, 3.4.2, 3.8, and 4.1.2.)

- Soil contaminated with paint-related wastes (heavy metals, especially chromium and lead) may exist in the general vicinity of Bldg. 973, the site of open-air sandblasting of vehicles and equipment.

- Soil contaminated with petroleum products may be present under the pavement adjacent to Bldg. 283; the area of open drummed waste storage shows very heavy oil staining of the pavement surface. (See Secs. 2.2.1, 3.1.1, 4.3.1, 4.1.2, and App. A.)

- Soil contaminated with petroleum products and heating fuel may exist under pavement in the DEH storage yard, north of Bldgs. 268 and 288. Probable sources of such contamination are a 200-gallon above-ground fuel tank behind Bldg. 268, which provides fuel for a nearby trailer; and a 10,000-gallon above-ground waste-oil tank behind Bldg. 288, which is ostensibly no longer in use. Areas beneath both of these tanks are heavily oil-stained. (See Secs. 2.2.2 and 3.7.)

4.4 RELEASES TO AIR

None of the known air releases listed below represents a violation of federal, state, or local air pollution regulations. No notices of air standards violations were identified for PSF. Many of the listed activities currently do not have specific numeric air release standards (e.g., chlorofluorocarbon releases or fugitive dust releases). Although the authority for promulgation of nitrogen oxide emission standards exists under the federal Clean Air Act, no such standards have been imposed upon PSF sources of nitrogen oxides.

4.4.1 Known Releases to Air

- Chlorofluorocarbons (CFC) are known to be released from various PSF refrigeration equipment, which cumulatively uses a total of 120 lb/mo of CFC. (Such releases reflect normal operating conditions of the involved units. CFC emissions from these refrigeration units are presently unregulated by federal, state, or local air pollution authorities.) (See Secs. 2.6 and 3.5.)

- Particulate emissions resulting from vehicle and equipment sandblasting, which occurs adjacent to Bldg. 973.

- Particulate and solvent emissions, resulting from painting occasionally conducted out-of-doors without containment, in areas adjacent to Bldg. 926. (See Sec. 3.1.1.)

- Particulate and nitrogen oxide (NO_x) emissions from five fuel-oil boilers located in Bldg. 1040. (NO_x emissions from these units are presently unregulated.) (See Sec. 2.6 and App. A.)

- Particulate and nitrogen oxide emissions from three fuel-oil boilers located in Bldg. 1802. (NO_x emissions from these units are presently unregulated.) (See Sec. 2.6 and App. A.)

- Hydrocarbon emissions vented to the atmosphere from painting and painted parts drying operations conducted at Bldg. 926. (See Secs. 2.2.1 and 3.1.1.)

- Hydrocarbons vented to the atmosphere from painting operations conducted in Bldg. 285. (See Secs. 2.2.4 and 3.1.2.)

- Hydrocarbons vented to the atmosphere from graphics operations conducted in Bldg. 1244. (See Secs. 2.2.4 and 3.1.4.)

- Hydrocarbons vented to the atmosphere from fuel-storage tanks located at Bldgs. 1088, 1349, 637, 1264, and 231.

- Hydrocarbon (solvent) emissions vented to the atmosphere from furniture stripping and refinishing operations conducted in Bldg. 1167. (See Secs. 2.2.4 and 3.1.2.)

- Particulate emissions resulting from abrasive blasting conducted out-of-doors adjacent to Bldg. 973.

- Particulate emissions resulting from abrasive blasting occasionally conducted out-of-doors adjacent to Bldg. 268.

4.4.2 Suspected Releases to Air

No other significant point sources of air emissions are suspected at PSF besides the sources noted above in Sec. 4.4.1.

5 PRELIMINARY ASSESSMENT CONCLUSIONS

5.1 GENERAL COMMENTS

The Presidio of San Francisco Military Reservation does not present an imminent or substantial threat to human health or the environment. Nevertheless, at least two instances of significant releases of contaminants to the environment have been documented for the Presidio, and contaminated groundwater is known to exist under some parts of the installation. However, no documentation exists which indicates that the groundwater (used for some of the PSF drinking water supply) has been jeopardized by the two existing conditions of groundwater contamination.

In addition to known releases, circumstantial evidence strongly suggests that other environmental releases may have taken place; further study is necessary to confirm and characterize those releases. Additional comments pertaining to areas of concern at the PSF and certain of its activities appear below. Comments on the probable migration pathways and impacted resources of released contaminants are also included.

5.2 CRISSY FIELD AREA

The "900" area of the old Crissy Field complex has been the site of maintenance activities since it was developed in the early 1900s to provide maintenance for aircraft and later to provide maintenance for military vehicles and equipment. This area of the PSF is also the site of the most clearly documented incident of environmental degradation at the installation (see Sec. 4.1.1 for references).

Groundwater contamination was discovered in 1981 during construction for a hydraulic lift inside Bldg. 937. A buried waste-oil pipe was found to be heavily deteriorated and was subsequently identified as being the probable source of the petroleum contamination discovered in the water table. This section of pipe most probably contributed to the contamination. However, it is likely that other buried piping near Bldg. 937 was similarly deteriorated, as was the underground waste-oil tank to which these pipes lead. Those other pipes, leading from vehicle maintenance ramps west of Bldg. 937, and the waste-oil tank located just west of Bldg. 937 have yet to be removed. (However, DOL shop personnel have indicated that the waste-oil tank is no longer used.)

Groundwater monitoring wells in the area around Bldg. 937 have been installed in a fan pattern away from the suspected source of petroleum contamination, but the monitoring of these wells has not been regular. Significant groundwater contamination has been confirmed by analysis of groundwater samples taken from the wells. A quantity of petroleum contamination was initially removed from the top of the water table, after discovering the problem in 1981, but a comprehensive plan to remediate the remaining contamination has yet to be developed. Inspection of one of these monitoring wells during the site visit showed an apparent oil sheen on the groundwater, which appeared to be approximately four feet below grade. No samples were taken, however.

Geohydrologic investigations undertaken in 1981 in conjunction with installation of the monitoring wells have concluded that, due to natural barriers and topographic features, the groundwater under and adjacent to Bldg. 937 is "static." Indeed, since the entire land surface of the shops area is covered by buildings or hard surface paving, rainwater recharge of the groundwater is expected to be severely reduced. However, geohydrologic studies to date appear to have not been extensive enough to precisely define the hydrologic circumstances. Recharge of the contaminated aquifer from upgradient groundwater sources and salt water intrusion into this area may still be occurring. The fact that the groundwater continues to exhibit contamination so long after the condition was first discovered seems to support the theory that the groundwater is relatively static. However, this may also imply the existence of other on-going sources of contamination in the Crissy Field area.

It should be also noted that water table elevations are expected to be very near the surface (probably less than 10 feet deep). Therefore, any underground tanks of appreciable size existing in this area may, in fact, be within the saturated zone, and thus subjected to accelerated deterioration. The condition of the waste-oil delivery pipe excavated from below Bldg. 937 appears to support this theory.

Throughout the shops area, materials and wastes are kept in open storage with no provision for spill-containment (see Sec. 4.1.2 for references). Wastes involved include waste oils and lubricants, waste paints and solvents, and vehicle batteries. Heavy staining from past spills onto paved surfaces was observed in many of these storage areas as well as in many other areas throughout the shops complex. Over time, such spilled materials may dissolve the asphalt pavement, contaminate underlying soils, and threaten the groundwater. The soil mantle in the area is expected to be very thin and without much attenuation capacity.

Those wastes not permeating the pavement are subject to flushing by rainfall to the storm-drainage system, which serves the area and discharges directly to the Bay without benefit of oil/water separators (with the exception of one wash rack near Bldg. 926). This action establishes a pathway for surface water contamination. An outfall to San Francisco Bay in the vicinity of the shops area has been noted on aerial photographs, but there have been no reported incidents of oil sheen observed at the storm-drainage outlet.

It was reported by DOL shop personnel that all automotive batteries received at the shop are drained of electrolyte and stored on pallets outside the shop building on a paved area with no provision for spill-containment. Although drained, these batteries may still be a source of heavy-metal contamination (lead), displaced from the batteries by precipitation to the storm-drainage system and ultimately to San Francisco Bay.

Painting is conducted inside Bldg. 926 in a water-curtain spray booth. DOL personnel report that water from this operation is discharged without treatment to the sanitary sewer and that accumulated sludges are periodically removed and managed as hazardous waste.

The DOL shops area is the source of significant air emissions as the result of sandblasting conducted in the open near Bldg. 973 (see Sec. 4.4.1 for references). Prevailing winds off San Francisco Bay serve to carry entrained particulates to the south, across the PSF. This sandblasting operation could potentially be a source of heavy-metal contamination in San Francisco Bay, should any removed paint particles be washed to the storm-sewer system. This possibility exists because it is a standard practice in the sandblasting operation to leave spent sand and particulates lying on the ground surface for substantial periods of time. Furthermore, when it is finally collected, this waste material is handled as a solid waste and not tested for the presence of leachable heavy metals (primarily lead and chromium are expected to be present).

From a series of aerial photographs, the central POL facility (Bldg. 640) is identified as having continuous heavy staining of the ground surface. The area in question (to the north of the building) is now covered with concrete pavement. It is not known, however, whether contaminated soils or pavement were removed prior to the installation of the concrete.

Similarily, ground staining around the vertical fuel-storage tanks has been identified from past aerial photographs. No such staining was evident during the site visit but, again, it is not known whether contaminated soils or pavement had been previously removed. Also, it should be noted that spill-containment berms for these tanks appear to be inadequate to contain fuels in the event of a wholesale tank failure. Releases of petroleum products to the ground surface and eventually to San Francisco Bay via the storm-sewer system would therefore result from such a failure.

The DEH equipment storage yard is known to be the site of an old gas station. Since the pump island is still in place, it is likely that the underground storage tanks were abandoned in place. However, there is no documentation establishing how these tanks were decommissioned.

It was also reported that four 10,000-gallon underground fuel tanks were removed from behind Bldg. 926. It is not known, however, whether these tanks were leaking prior to their removal or whether underground piping associated with the tanks was also removed (see Sec. 3.1.1).

It has also been reported that a 1,000-gallon tank located near the northwest corner of Bldg. 937 at one time was used to store xylene, a solvent used in the maintenance of seaplanes at Bldg. 937. This tank is said to no longer be in use, but it is not known whether it has been properly decommissioned.

In summary, there are many possible sources of ground and surface water contamination in the Crissy Field area. Tank failures and past releases have been documented. However, this groundwater is not now being used as a potable supply, and there is very little likelihood that it will ever be. Furthermore, this contaminated aquifer poses no threat to potable groundwater supply wells on the PSF, because these wells are all upgradient. Although groundwater flow gradients in this area are expected to be slight, the ultimate discharge point of this groundwater is San Francisco Bay; marine organisms are thus potentially threatened by this contamination. This area needs further studies to define the nature and extent of contamination. The extent of

necessary remediation in this area could be determined based on findings of future remedial investigations recommended in this assessment. It is likely that any remedial action plan would need to address the entire Crissy Field maintenance shops area, given the number of possible sources of groundwater contamination besides the deteriorated waste-oil pipe discovered in 1981.

5.3 AAFES SERVICE STATION, BUILDING 931

A second documented incident of significant contaminant release occurred in 1988 at the AAFES service station (Bldg. 231) (see Sec. 4.1.1 for references). The release was discovered when the four underground fuel storage tanks at this location failed to pass leak-testing. The leaking tanks were removed, as was a quantity of fuel-contaminated soils from the immediate vicinity of the tank excavations. However, subsurface investigations in the apparent downgradient direction of the tanks revealed that the contaminant plume had migrated beyond the area that was excavated. Estimates placed volume of the contaminated soils yet remaining to be 1,000 yd^3. The PSF plans to implement a remedial plan to address this contamination. A directive to this effect was given to PSF in June 1989 by the California Water Quality Control Board (see App. A, Sec. A.3.4). If allowed to migrate further, this contaminant plume may reach groundwater, and, eventually, San Francisco Bay. In previous investigations, only soil was sampled, so no documentation of groundwater contamination resulting from this spill has yet been established. It should also be noted that rainwater infiltration in this area is greatly reduced since the area is almost completely covered by asphalt pavement. This condition of groundwater contamination does not jeopardize potable water supply wells located on PSF, which are all upgradient of this location.

5.4 NIKE LAUNCHER AREA, BATTERY 89L

Little documentation exists for the former PSF Nike battery (see Secs. 2.2.9 and 3.10). Neither the disposition of wastes generated during its active life, nor the specifics of the battery's decommissioning have been documented. However, PSF personnel have reported that accumulated trash and abandoned debris may have been thrown into the missile silos when the battery was closed. The silo doors have been welded shut, and access to the silos for inspection was therefore impossible.

It is also possible that the hydraulic systems for the missile elevators have been abandoned in place. The hydraulic systems would, therefore, be a potential source of contamination of the subsurface soils and the groundwater, once the system reservoir and associated plumbing deteriorates to a point where it can no longer contain the hydraulic fluid.

In addition, with respect to the silos, the possibility exists that they contain electrical transformers with PCB dielectric fluids, although in most cases, transformers serving the silos would have been located at the ground surface. Inspection of the silos is necessary to determine the presence of waste materials, the presence of electrical transformers, and the condition of the hydraulic system.

The battery is also expected to have had fuel-storage tanks on-site to support emergency power generators. No such tanks were discovered during the site visit, however, nor were records discovered of such tanks ever existing at the site.

With respect to wastes generated during the battery's operation, it can be argued that since this battery was located on an active military post, the battery commander availed himself of disposal opportunities existing on the post rather than disposing of wastes on the battery site. Likewise, ancillary activities at Nike batteries, such as vehicle and equipment maintenance, may also have been performed at an appropriate PSF facility, rather than at the battery site. Indeed, the collection of remaining structures at the site suggests that only missile-launch training and test-firing activities had been conducted at this site.

There has been no documentation of contamination normally associated with Nike battery operation emanating from the battery site.

With respect to current activities at the site, the current tenant (87th Ordnance) does not engage in activities at the site that would result in degradation of the environment. However, the site visit revealed that trash and debris of a nonhazardous nature has been allowed to accumulate on the property.

The former Nike battery site lies approximately one-half mile east-northeast of the existing potable well field for the PSF. Limited groundwater studies at PSF suggest that groundwater movement is generally northwest, but more specific studies have not been conducted. There is a possibility, therefore, that the battery site may lie upgradient of the PSF wells. However, no battery-related contaminants have ever been reported in groundwater recovered from PSF potable wells.

5.5 PSF LANDFILLS

Information regarding landfilling at PSF is largely circumstantial or ancedotal in nature. PSF personnel have identified 10 areas where landfilling activities have been conducted, and the existence of actual landfills at many of these areas is apparently corroborated by independent interpretations of aerial photographs (see Sec. 3.11). General concerns associated with all PSF landfilling are as follows:

- None of the landfilling has been conducted in accordance with engineered plans. Thus, the exact locations, areal extent, and depths of deposited wastes are not precisely documented but rather exist only in institutional memory.

- There have been no geohydrologic studies conducted at any of the landfill sites (either before their use or afterward) to characterize the underlying soils, geologic units, or aquifers. Thus, some of these sites may be above one of the numerous Dune sand formations beneath PSF. Figure 3-6 appears to support this possibility. However, it must be remembered that the landfill locations displayed in Fig. 3-6 are very approximate at this point. Migrations

of leachates to highly permeable sand formations may, therefore, result in relatively rapid and uninhibited flow of contaminants to groundwater.

- There have been no waste stream controls at any of the landfills. Since some of these landfills may also have pre-dated the establishment of specific procedures for handling dangerous or hazardous wastes resulting from various maintenance activities, such materials may have been deposited at one or more of these sites.

- Landfills were closed by PSF without closure plans or post-closure monitoring.

- Landfilling of building debris, which has occurred to a great extent at PSF, may have involved the landfilling of asbestos-containing insulation and construction materials. Thus, since such debris disposal sites are not clearly documented, accidental disruption of this material is possible during any future construction or excavation activities, with the resulting possible air entrainment of buried asbestos.

Of the 10 landfill locations identified by PSF personnel, four represent the greatest potential for adverse environmental impact and are deserving of additional characterization and study.

Landfill area #3 is the current waste-transfer facility for PSF. As noted in Sec. 3.11, operational parameters and facility design are not adequate to prevent hazardous or toxic materials from being wrongfully delivered to this facility. DEH personnel attempt periodically to remove such inappropriate materials and combine them with PSF hazardous waste streams. However, this procedure is not failsafe protection against such materials going to off-site sanitary landfills in violation of state or federal regulations. Furthermore, the adjacent temporary storage area for the removed articles has no provision for spill-containment and is thus itself a source of potential soil contamination, especially since many of the containers are likely to be damaged or heavily corroded. Also, since there is no access control or policing of this transfer facility, clandestine discharging of wastes to the surrounding land areas is possible and may have taken place, as evidenced by empty containers observed in the surrounding wooded areas.

Landfill area #4 appears to have been the largest and most long-lived disposal site at PSF. Given that this landfill was operational in recent times, but before the advent of hazardous-waste management and disposal regulations, it is possible that industrial and chemical wastes have been disposed of at this location. There have been no reported incidents of contamination or observed leachates at the toe of this steep hillside disposal area. Investigations are nonetheless warranted for this site, especially given the reported depths of fill (greater than 14 feet) and the PSF shop-related wastes that could have been disposed of here.

Landfill area #5 is said to have been operated coincident with area #4 and thus could have also received wastes of concern. This landfill, too, was a steep hillside disposal area, the only remaining evidence of which may be distressed mature trees lining the reported toe of the fill site. Such stress may be the result of tree roots being covered by fill and cover material.

Landfill area #7 is said to have received a wide variety of wastes from the maintenance shops, including some liquid wastes. The existence of this landfill appears to be well corroborated by aerial photograph interpretations. Because of its location, any leachates from this site may directly threaten San Francisco Bay. Indeed, photographic interpretations have identified an outfall, but it is unclear whether this represents leachate from the fill site or a storm drainage outlet. Given the public's access to this site, some study is warranted to guarantee that it has stabilized or to determine whether excavations or additional cover are appropriate. This fill area may be in both GGNRA and Army jurisdictions. A study defining the exact areal extent of the fill would provide a precise answer as to which jurisdiction is responsible for this fill site.

Landfill area #8 is reported to have been used exclusively for wastes generated at the USPHSH complex and ceased operation before the USPHSH came under Army jurisdiction. The landfill area is generally corroborated by aerial photographic interpretations. Limited geologic studies at the PSF have suggested that the landfill lies over a Dune sand formation which may be the principal water-bearing formation below PSF (see Fig. 3-6). Given that landfill area #8 may be upgradient of the PSF potable well field, additional investigations are warranted to guarantee that leachate from this landfill is not contaminating the Dune sand aquifer, and thus jeopardizing potable water supplies (although no contamination has been detected in any of the water wells).

With respect to the remaining five landfill areas, available information does not suggest that problematic wastes have been deposited at these fill sites. There is no documentation of environmental problems at any of the sites. Nevertheless, good engineering practice suggests that each of the areas needs to be further investigated to determine the areal extent of deposited waste materials. This would preclude inadvertant disruption of the fill areas by future construction activities.

Finally, with respect to possible disposal/discharge areas on PSF discussed in Sec. 3.11.3, the following information was derived solely from interpretations of aerial photographs.

Waste-disposal activities at any of these areas have not been specifically confirmed by PSF personnel. It should be remembered that photographic interpretations cannot necessarily distinguish between landfilling of waste materials and construction excavations. Many of these cited areas may be construction projects and represent no threat to the environment. Of the five possible disposal/discharge areas discussed in Sec. 3.11.3, areas B, C, and D have already been addressed above in conclusions regarding the Crissy Field Complex (see Sec. 5.2). Area E appears to be a construction project associated with the construction of a baseball diamond. However, land surface disturbances continue outside of the diamond well beyond the time when the diamond was apparently complete. No available information identifies this area as receiving solid or hazardous wastes, nor have PSF personnel been able to identify it as receiving any waste materials.

The remaining area discussed in Sec. 3.11.3, Area A (referred to as DA #1 in photographic interpretations), is along the coastal ridge on the west boundary of the PSF. Again, no evidence is available linking this area with solid or hazardous waste disposal. However, this area has shown disturbance over a long period of time, and PSF personnel have indicated that it had long been an unauthorized waste dumping site used by the general public. The area appears to be within GGNRA jurisdiciton.

5.6 U.S. PUBLIC HEALTH SERVICES HOSPITAL (see Sec. 2.2.8)

The hospital complex occupies a 36.5-acre parcel in the south central portion of PSF. Hospital operations began in the late 1800s in this area with the establishment of the Marine Hospital, and hospital activities continued under the auspices of the Public Health Service until 1981. The Defense Language Institute occupied portions of the facility until January 1989, and some LAIR research activities are currently conducted on the sixth floor of the main building.

The records show that the original buildings comprising the Marine Hospital have been demolished and reportedly buried in the area north of the current building complex. This building debris probably included asbestos-containing insulation and construction materials. It is also believed that this same disposal area, identified in Sec. 3.11 as landfill area #8, received all solid wastes generated by the Marine Hospital and the PHSH during the periods of their operations. Among materials probably disposed of in this fill, therefore, are infectious wastes generated from the treatment of patients. Also, infected laboratory animals (primarily mice and dogs) and tissues and body parts of those animals are likely to have been disposed of here.

During its operation, the hospital maintained an incinerator, presumably used for the incineration of infectious tissues, body parts, research animals, and related wastes. Ash from this incinerator is also believed to have been disposed of in this landfill.

With respect to hospital-derived wastes, although some chemical wastes may have been present (e.g., solvents), the greatest environmental hazards expected from these waste streams are infectious organisms. Because of incineration, however, or as a result of burying the wastes, they are not likely to still be infectious (even though some infectious organisms may still be viable). This disposal site is not considered to be a significant threat to human health or the environment. Nevertheless, it is important to know the exact areal extent of the waste fill to prevent inadvertent excavations of buried waste materials.

Furthermore, although groundwater profiles and gradients at the PSF have not been extensively studied, it appears safe to conclude that the USPHSH landfill (landfill area #8) lies generally upgradient of the PSF potable well field. No adverse impacts on the groundwater have been documented from landfill area #8. This landfill area nevertheless needs further study to define its *possible* threat to drinking water supplies.

The site visit confirmed that construction of a helicopter landing pad adjacent to the hospital's south parking lot involved the use of building debris. Here, too, it is expected that this debris may have contained asbestos.

Neither the helicopter pad nor the main disposal area north of the buildings represents a threat to the environment from asbestos that may be present -- unless excavations in the area accidentally unearth this material and cause it to become airborne. Again, knowing the exact locations of these fills would enable PSF to prevent such occurrences.

It has been reported that a cemetery also exists in the area north of the hospital buildings (now believed to be partially covered by the paved parking lot). However, additional study is necessary to establish the exact location of this cemetery.

With respect to the hospital building complex, all buildings are known to contain asbestos insulation. Furthermore, asbestos present in the boiler house in the form of boiler and pipe insulation is known to be significantly deteriorated and to constitute a significant health threat to all who enter this room.

It was also reported that the boiler house may have at one time relied on an underground fuel-storage tank, although the current status of this tank is unknown. Likewise, the original buildings on this site may also have had underground fuel-storage tanks. It is not known whether those tanks were removed when the buildings were razed. Since the current buildings are constructed in the same general area, it is reasonable to assume that the majority, if not all, of those early storage tanks were removed to prepare the area for construction of the new buildings.

5.7 DEH COMPLEX (see Secs. 2.2 and 3.1)

Except for some equipment storage which takes place in the Crissy Field shop area, the DEH activities are confined to the collection of storage buildings and shops at the northeast corner of the PSF. Like the Crissy Field complex, these buildings have served as maintenance shops for a long period of time.

There have been no documented incidents of releases of contaminants from this DEH complex. Areas of concern include the open hazardous-waste storage area behind Bldg. 268 (see Sec. 4.1.2 for references). The storage area has no provision for spill-containment and is located approximately 200 yd from San Francisco Bay. Spills from this area may also reach the drain for the adjacent wash rack, which discharges to the Bay through an oil/water separator.

Building 268 is a three-sided equipment vehicle and maintenance garage with a dirt floor. The building has been used to store hazardous materials, and portions of the floor are heavily stained from past spills. Such spilled material may eventually percolate to the groundwater which, as in the Crissy Field area, is expected to be close to the surface.

Hazardous materials used in DEH maintenance activities are stored in metal POL buildings lining the east boundary of the DEH facility. Although there is no spill-containment around these POL buildings, the potential for accidental release of hazardous materials is low.

Activities within the various shops areas also do not present significant potential for adverse environmental impact.

Bulk-oil storage occurs in an above-ground tank positioned in the northwest portion of the DEH facility. This tank is staged within a concrete vault. The entire area within the vault is very heavily stained with oil, as is the tank itself. The oil appears to be contained within the vault, and no ground surface contamination was observed around the vault. In the event of wholesale failure of this tank, the vault's volume is insufficient to hold the entire tank contents. Spilled materials would threaten the bay, either by surface runoff or by drainage to the storm sewer, which empties to the bay without an oil/water separator.

5.8 UNDERGROUND STORAGE TANKS AT PSF

Categorically, underground storage tanks at PSF represent the greatest potential for environmental degradation. More than two hundred such tanks are identified as in use or abandoned in place on PSF (see Sec. 3.8). Two tanks are known to have failed (at Bldgs. 937 and 231) and to have contaminated soils and groundwater (see references in Sec. 4.1.1).

Records of tank installations and abandonments, and inventories of underground tanks and tank specifications, are generally unreliable or incomplete. The inventory submitted by PSF in compliance with state and federal underground tank registration requirements cannot be easily reconciled with the complete array of known underground tanks. Of course, those registration requirements do not extend to tanks storing fuel for indirect heating or tanks below a certain capacity, so discrepancies between the two lists are to be expected. Despite their exclusion from registration requirements, however, tanks storing indirect heating fuels are no less a potential threat to the environment than USTs with other contents.

It has been reported that a number of underground tanks have been abandoned in place, but their decommissioning is not documented. The exact locations of these tanks have long since been lost, especially those referenced to a building that has been demolished.

Underground tanks installed in the Crissy Field area, with its high water table elevations and possible salt water intrusion into the uppermost aquifer, are expected to have undergone accelerated deterioration. These tanks may therefore have been point sources of subsurface contamination well before their abandonment.

Since no systematic program of leak testing has existed for tanks at PSF, leaks can continue undetected for long periods. Moreover, given the numerous Dune sands under PSF, contaminant plumes may migrate unimpeded in these formations. The limited information about groundwater movements under PSF also limits the ability to predict contaminant-plume migration patterns. Furthermore, no underground tanks currently in use are equipped with leak-detection devices or secondary-containment features. Therefore, regular leak testing is the only mechanism available for detecting possible environmental releases. Leak testing is required for all underground tanks by federal

regulations in accordance with a schedule based on the age of the tank. The PSF has not yet developed a schedule of action toward compliance with those leak-testing requirements.

5.9 WASHRACKS (see Sec. 3.1.5)

Of the five military vehicle and equipment wash racks operational on PSF, only one, located at Bldg. 662, is not equipped with an oil/water separator. All washracks eventually discharge to the PSF sanitary sewer. The AAFES car wash, Bldg. 207, is also equipped with an oil/water separator.

Assuming that these oil/water separators are well maintained, the washracks are expected to have minimal adverse impact on the environment. It should be noted, however, that the washrack at the DEH complex (near Bldg. 268) is in close proximity to the hazardous-waste drum storage area and may receive spills tht could occur in that storage facility. It is important, therefore, that this possibility be recognized in the spill-contingency plan developed for the PSF.

5.10 MOUNTAIN LAKE AND LOBOS CREEK (see Secs. 2.4.3, 2.4.4, and App. A)

DEH personnel suspect that Mountain Lake has been contaminated by pesticide and fertilizer runoff from the nearby golf course. Such contamination is reported to have occurred on a number of occasions, but reliable analytical results documenting such conditions are not available.

Limited geohydrologic studies of the PSF have determined that Mountain Lake is spring-fed, but the exact nature of the hydraulic connections between Mountain Lake and groundwater aquifers is not known. Therefore, contamination of Mountain Lake should be considered a potential threat to groundwater in the vicinity of the lake. Furthermore, since Mountain Lake is generally upgradient of the PSF potable water wells, contamination of the Lake may also threaten the groundwater portion of the PSF drinking water supply.

Mountain Lake was sampled in 1988 as part of an area study to identify aquifers and determine groundwater-surface water interactions within the San Francisco Peninsula (see App. J). However, no conclusions from that study have been put forth. In the absence of information to the contrary, Mountain Lake should be considered a potential conduit to groundwater contamination.

Lobos Creek, which currently supplies more than 70% of the PSF potable water, is also spring-fed, with the flow augmented by precipitation runoff from steep adjoining hillsides. Lobos Creek appears isolated and protected from industrial activities and known situations of environmental contamination at PSF. Recurring TTHM problems at the PSF water-treatment plant appear to have been correctly traced to excessive vegetative growth, with resulting high organic-carbon levels in the Creek. It should be pointed out that there are some minor discrepancies in TTHM data interpretations among the three previous studies of Lobos Creek and the PSF water-treatment plant and

distribution system.[3,33,34,36] However, the substantive conclusions and recommendations of those studies are in agreement as to cause and remedy of the TTHM problem.

Limited geohydrologic studies at PSF have not specifically defined all hydrologic connections to Lobos Creek. It is possible that Lobos Creek and Mountain Lake may have such a connection. If so, pesticide and fertilizer contamination reported in Mountain Lake may also have an impact on Lobos Creek. No systematic sampling of the creek for pesticides has yet been performed. Clearly, Lobos Creek is in jeopardy of receiving garden-variety fertilizer and pesticides and other organic wastes from private home gardens located atop the adjoining hillside. In fact, fertilizer runoff to the creek may somehow affect the dense vegetative growth in the creek.

5.11 GROUNDWATER WELLS ON PSF (see Secs. 2.4.3, 2.4.4, 2.4.8, and App. A)

There are currently six potable groundwater supply wells, all located in the southwest corner of the PSF. However, the numbering system used for these wells suggests that there have been at least seven other wells operational in this area. There is no evidence of the specific number and locations of other wells and no documentation as to whether they were properly sealed. Currently, only two wells (#6 and #13) are operational. No available documentation indicates that the four remaining wells were permanently sealed.

Previous investigations identify little documentation regarding the design of the wells or the stratigraphic profiles at their locations. However, it is believed that all the wells are finished in Dune sand deposits, the only reliable water-bearing formations believed to exist below PSF. The wells also appear to lie downgradient from the PHSH complex (and landfill area #8), perhaps even downgradient from the abandoned Nike missile-launch area. Nevertheless, no significant contamination has ever been identified in any of these six wells. Except for the 1988 sampling, extensive sampling of these water wells for priority pollutants has never been carried out.

Three nonpotable groundwater wells are located just north of Mountain Lake. Only one is operational. The status of the other two wells is unknown. No analyses of water from these wells for priority pollutants have ever been performed. Furthermore, no geohydrologic studies have been performed which show the interrelationship of the groundwater from which these wells draw and Mountain Lake.

Finally, ANL investigators were provided with analytical results from recent sampling of groundwater wells, surface water sources, and various distribution points within the municipal water system in the San Francisco Peninsula.[52] In all, 28 locations were sampled, including Mountain Lake, Lobos Creek, and two of the potable groundwater wells on PSF (#6 and #13). It should be noted that for this study, a sample was taken from El Polin Spring, which was considered dry by an earlier study (see Sec. 2.4.3). Since these results are not derived from published research, they have not been included in summaries of past studies in Sec. 2.5 and App. A; nevertheless, they deserve mention in the following paragraphs.

Groundwater, surface water, and finished water (treated, filtered, and ready to drink) were sampled as part of an initial effort to gather more specific information on the hydrologic systems existing on the peninsula. A number of parameters were chosen for analysis in order to "fingerprint" the water withdrawn from the various locations and thus give investigators the opportunity to identify the hydraulic connections between these locations.

Unfortunately, the methodologies of this study, especially in the area of quality control, are not available. Thus these analytical results alone are not a reliable basis on which to draw conclusions for this preliminary assessment. For completeness, however, the analytical results of this study are provided in Appendix J. Sampling locations for this study are shown in Fig. J-1.

Figure J-1 displays only 23 of the 24 sampling locations from the 1988 study. One sampling location (#24) is identified only as "Home Laundry w/softener." This is presumed to be a private residence connected to the municipal water supply. It cannot be precisely located using available data. Also, sampling point #22, presumably also a withdrawal point in the municipal water distribution system, is identified only as "Hensil Hall, 5th Floor" (San Francisco State University). Therefore, its position cannot be more precisely located.

5.12 AREAS WITH NO KNOWN OR SUSPECTED ENVIRONMENTAL PROBLEMS

This enhanced preliminary assessment has identified environmentally significant operations at PSF and characterized known and suspected releases of contaminants from those areas and facilities.

Several hundred other PSF buildings, as well as PSF land areas of significant size, have not been specifically mentioned or identified as sites of known or potential ESOs, although a number of the buildings may be served by nearby underground storage tanks (see App. G). Facilities and areas not associated with known or suspected environmental problems include family housing units and areas, administrative buildings, the commissary area, the golf course, and large undeveloped tracts of land. Section 6 of this report recommends further investigations of all underground storage tanks at PSF. Section 6 also recommends completion of the ongoing asbestos survey at PSF. Many of the buildings not specifically mentioned in this assessment are expected to be included in those installation-wide investigations of underground tanks and asbestos.

Notwithstanding problems discovered in connection with underground tanks and asbestos, there is no evidence to suggest that buildings or areas not covered in this assessment contain environmentally significant operations or have been the site of past environmental releases. No additional environmental investigations in these areas are therefore warranted. The absence of information indicating adverse environmental impacts does not lead to the sole conclusion, however, that these areas are free of contamination. A number of ESOs at PSF — especially landfill areas #3, #4, #5, and #8 — may have been sources of contaminant releases, which may have affected other areas. Unidentified releases from underground tanks may also have affected them.

The complexity of subsurface geology at the PSF, the limited amount of available groundwater data, and the presence of man-made alterations to subsurface soils (numerous artificial fills and buried sewer and utility lines) prevent any reliable predictions on the direction and extent of impacts from identified ESOs at this time. The remedial investigations of ESOs recommended in Sec. 6 of this assessment would provide the necessary technical basis, however, for concluding that certain PSF areas have been unaffected by known or suspected contaminant releases.

6 PRELIMINARY ASSESSMENT RECOMMENDATIONS

The PSF presents no imminent or substantial threat to human health or the environment. Consequently, no emergency remedial actions are warranted. However, a number of actions are necessary to address known conditions of contamination, and to more completely characterize suspected or potential releases to the environment.

The following 25 recommendations are divided into three categories (not necessarily in order of their environmental priority): actions necessary to address known conditions of environmental contamination (Sec. 6.1) actions necessary to characterize potential contaminant releases to the environment or better identify critical pathways of contaminant migration (Sec. 6.2), and actions to eliminate or reduce the possibility of future contaminant releases to the environment (Sec. 6.3).

6.1 ACTIONS TO ADDRESS KNOWN RELEASES

1. After studying the feasibility of identifying groundwater contamination in the Crissy Field maintenance shops area, develop and implement a remedial plan for the area. At a minimum, this plan should address removal of petroleum contamination from groundwater and removal of the waste oil tank and associated plumbing at Bldg. 937.

2. Develop and implement a remedial plan to address soil and possibly groundwater contamination resulting from the failure of underground storage tanks at the AAFES service station (Bldg. 231). This plan should comply with the specific directives of the California Water Quality Board issued in June 1989.

3. Remove or repair the leaking transformer at Bldg. 1040 and develop and implement a plan to remove PCB-contaminated concrete and soils for proper disposal.

4. Proceed with the development and implementation of proposed remedial actions to address residual soil petroleum contamination believed to exist in the area surrounding Bldg. 210.

6.2 ACTIONS TO CHARACTERIZE POTENTIAL RELEASES OR DESCRIBE MIGRATION PATHWAYS

5. Verify the existence and status of all groundwater wells on the PSF and sample those not permanently sealed for priority pollutants. Wells that have been abandoned and are unlikely to be put back into service should be properly sealed.

6. Sample water and sediments in Mountain Lake and Lobos Creek for pesticide contaminants (especially those chemicals known to be in use at the golf course) and other priority pollutants.

7. Undertake a systematic survey of underground storage tanks at the PSF, determining their exact locations and status.

8. Excavate all abandoned tanks whose status cannot be established by documentation or observation.

9. Inspect silos at the former Nike missile-launch site and remove any encountered trash and waste for proper disposal. Inspect the silos for the presence of electrical transformers and, if found, test the dielectric fluids for the presence of PCBs. Finally, inspect the silos to determine the status of the hydraulic system, and develop a plan to remove any hydraulic fluids found.

10. Perform additional studies and characterizations of PSF landfill areas #4, #5, #7 and #8. These sites should be characterized as to their areal extent, depth of fill, depth to uppermost groundwater aquifer, and their impact on groundwater quality. (Landfill areas #1, #2, and #9 are believed to have received only clean fill and therefore need no further study. Landfill areas #6 and #10 are believed to have received primarily building rubble. The presence of asbestos-containing materials is therefore a possibility for both of these fill areas. However, since both areas are now covered by pavement, their future disturbance is unlikely, and no additional studies of these areas are warranted.)

11. Additional controls should be established for landfill area #3 if it is expected to continue as the PSF solid-waste transfer station. These controls should be designed to prevent or minimize the delivery of hazardous wastes to this facility. Additionally, the temporary storage area for inappropriate chemical wastes that have been retrieved from PSF waste containers should be upgraded with spill-containment measures.

12. Sample soils underlying all visually stained pavement around the various maintenance shop buildings (Bldgs. 283, 924, 926, 937, and 1351) for petroleum contamination. Heavily stained asphalt pavement may need to be removed, as well as contaminated underlying soils. (Contaminated soils in the vicinity of the DOL maintenance shops at Bldgs. 926 and 937 may be better addressed by the groundwater remedial plan, recommendation 1 above.)

13. Remove electrical transformers from behind Bldg. 924, sample their contents for PCBs and manage, and dispose of the transformers as necessary. Should these transformers be found to contain PCBs, the soils in the area behind Bldg. 924, where they had been placed, should be sampled and analyzed for PCB contamination.

14. Test soils under pavement in front (east) of the central motor pool building and under the pavement in the area of the central POL storage area for petroleum contamination.

15. Sample the pavement and subsurface soils in the area of the former transformer storage area (Bldg. 927) and analyze for PCB contamination, removing any contaminated pavement and soils encountered for proper disposal.

6.3 ACTIONS TO ELIMINATE OR REDUCE THE POTENTIAL FOR FUTURE RELEASES

16. Where feasible, remove all underground tanks from Crissy Field and the DEH area and replace them with above-ground tanks.

17. Complete the installation-wide survey of asbestos and undertake remedial actions as indicated. Remedial actions to remove deteriorated asbestos insulation at the USPHSH boiler room should be completed.

18. Install oil/water separators at all storm drains that service Crissy Field and the DEH area and discharge into San Francisco Bay.

19. Improve spill-containment measures for the central POL area so as to satisfy the requirements of federal and state regulations; and develop, for incorporation into the PSF spill-contingency plan, specific response actions for releases from POL storage facilities.

20. Analyze waste materials generated during vehicle and equipment sandblasting at Bldg. 973 to determine hazardous constituents and their characteristics; modify waste-management practices involving these materials accordingly.

21. Complete the development of hazardous-materials inventories and contingency plans for PSF emergencies.

22. Upgrade the design of hazardous-waste storage areas, including all satellite storage areas, by installing impervious liners and other spill-containment features to prohibit the runoff of spilled waste materials and the entry of precipitation.

23. Where feasible, replace outdoor hazardous-waste and hazardous-materials storage facilities with sheltered storage facilities.

24. Analyze paint filters recovered from Bldg. 285 to determine their hazardous characteristics and amend existing waste-management procedures accordingly.

25. Stop the practice at Bldg. 283 of mixing waste-degreasing solvents with waste oils.

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APPENDIX A:

SUMMARIES OF ENVIRONMENTAL STUDIES AT PSF

A.1 WATER QUALITY EVALUATIONS/CONSULTATIONS

A.1.1 Water Quality Monitoring Consultation No. 66-0115-77, Jan. 24-28, 1977[30]

The purpose of this consultation was to evaluate the operation and adequacy of PSF drinking water and wastewater programs.

Water is supplied to PSF by six wells and Lobos Creek (see Fig. 2-6). The well water is chlorinated and fluoridated and then pumped to the main storage reservoir on Presidio Hill. Surface water treatment consists of prechlorination (gas) followed by sedimentation, sand filtration, and fluoridation (sodium silicofluoride). Following treatment, the water is pumped to a clear water well, chlorinated, and then pumped to the Presidio Hill storage reservoir. The PSF occasionally obtains water from the City of San Francisco during peak demand periods in summer months.

All wastewater generated at PSF is discharged to the City of San Francisco sanitary sewer system.

PSF was issued National Pollutant Discharge Elimination System (NPDES) Permit No. CA 0006904 on Dec. 31, 1973 for wash rack and filter backwash discharges. The Permit had determined 11 (001-011) discharge points in PSF. Analyses required by the Permit were conducted by Pacific Environmental Laboratories. The original Permit required elimination of discharges by December 1975, but these deadlines were not met. Therefore, the Permit was modified and required elimination of discharges by June 30, 1977. At the time of this survey, all of the permitted discharges had been eliminated or routed to the sanitary sewer, with the exception of three discharges which were scheduled to be eliminated or routed to the sanitary sewer prior to the NPDES permit expiration date, June 30, 1977.

The water treatment plant (WTP) filter backwash discharge was eliminated in February 1976 by a construction project which allowed the filter backwash water to be reclaimed. However, the reclamation system had not functioned properly because of poor piping design. The continuation of discharges from the WTP, although posing little threat of pollution to the Pacific Ocean, constituted a violation of the NPDES Permit.

Several additional discharge points at PSF were not listed on the NPDES Permit, and were identified by this survey. These discharge points were minor and were scheduled to be eliminated or routed to sanitary sewers.

The chlorine residual was monitored three times daily at the PSF WTP and daily in the distribution system. A review of past records at PSF indicated adequate chlorine residual was maintained in the distribution system. It was noted that an insufficient number of samples were collected from the PSF water distribution system for bacteriological analyses. It was also found that the frequency and location of fluoride sampling at PSF were adequate, but the fluoride test procedure utilized was not a standard method. Generally, the drinking water surveillance program was found to be adequate.

This consultation work recommended: elimination of PSF discharges to the sanitary sewers by June 30, 1977 to insure compliance with NPDES Permit No. CA 0006904; and collection of a minimum of 25 samples for coliform determination each month, prorated on a weekly basis, from the PSF distribution system.

A.1.2 Water Quality Engineering Consultation No. 66-0179-78, May 30 - June 2, 1979[31]

The purpose of this consultation was to investigate alternatives for bringing the PSF WTP into compliance with its wastewater discharge permit.

A Water Quality Monitoring Consultation (see Ref. 30) identified that the wastewater reclamation system was not functioning properly. Intermittent discharges to the Pacific Ocean occurred in violation of the PSF NPDES Permit No. CA 0006904 as modified March 25, 1976.

The reclamation system was designed to recover wastewater produced by the back washing of the WTP filters and the cleaning of the WTP sedimentation basin. The system was installed in 1976 to eliminate wastewater discharged to the Pacific Ocean in accordance with the NPDES Permit No. CA 0006904.[30] The reclamation system employs a batch type process to treat the wastewater. Initially the water enters the rapid mix chamber where alum is added to enhance coagulation. After rapid mix, the water flows into the 55,000 gallon flocculation/sedimentation basin. The supernatant is then pumped to the head of the WTP sedimentation tank and the sludge to the sanitary sewer at Bldg. 174.

The reclamation system had not been operational for approximately one year (that is, since October 1977). Neither the supernatant pump nor the sludge pump were operational. Problems had been encountered with the sludge pump.

The supernatant line from the floculation/sedimentation basin to the WTP sedimentation tank was broken. Numerous breaks had previously occurred in this line and in the sludge line to Bldg. 1974.

NPDES Permit No. CA 0006904 prohibits discharge of the backwash water or the WTP sedimentation tank cleaning water to Pacific Ocean.

The feasibility study suggested shutting down the WTP when the sedimentation tanks need to be cleaned, as was done prior to the installation of the reclamation system. Because of the high demand for potable water at PSF and the installation's past policy of not purchasing water from the City of San Francisco, shutting down the entire WTP may be not feasible at numerous times during the year. The sedimentation tank is normally cleaned about four times each year. Proper operation of the reclamation system requires a reduction in the amount of water entering the reclamation system.

The PSF WTP is an old one with portions of it having been constructed prior to 1910. Raw water from Lobos Creek is prechlorinated prior to entering the rectangular, dual compartmented, sedimentation tank where sand and fine debris are removed. The water flows into a clear well before being pumped to the distribution system.

May 1974 feasibility study estimated the filter backwash rate at 1100 gpm to the sedimentation system or 7.15 gallons per minute per square foot (gpm/ft^2) through the filters. This is approximately half of the recommended value of 15 gpm/ft^2.

According to plant records, 65,000 gallons of water are used to backwash the four filters. The consultation study concluded the following: for the Reclamation System, (1) the supernatant and sludge pumps were inoperative, (2) the present pump could not handle the sludge from the sedimentation tank, (3) the sludge line needed clean outs to allow operators to remove clogs, (4) the backwash water should be pumped to the sanitary sewer line by the sludge pump when problems with the supernatant return line occur, (5) independent operation of the two compartments of the sedimentation tank was needed to avoid complete shutdown of the WTP during the cleaning of the sedimentation tanks, (6) the reclamation system could not handle the volume of water from one compartment of the sedimentation tank unless the top half is pumped to the filters, and (7) a structure was needed to prevent corrosion of the reclamation system controls. The study concluded the following for the WTP: (1) all four filters needed to be operated automatically to prevent short circuiting of the sedimentation tank, (2) based on a backwash rate of 15 gpm/ft^2 the reclamation system had capacity for backwash water from only two filters, and (3) a flow measuring device was needed to determine the rate of filter backwash and the amount of backwash water used.

In addition, this study recommended the following for the Reclamation System:

1. Repair the supernatant and sludge pumps,

2. Install a positive displacement sludge pump,

3. Install clean outs on the sludge line,

4. Pump backwash water to sanitary sewer line when reclamation system malfunctions,

5. Provide for independent operation of the two sedimentation tank compartments,

6. Provide pumps to remove half of the water in a sedimentation tank compartment prior to cleaning, and

7. Construct a structure over the reclamation system to prevent corrosion of controls

The following recommendations were made for the water treatment plant:

1. Repair the two inoperative automatic filter flow devices,

2. Backwash only two filters in one day, and

3. Install a flow measuring device on the backwash water influent line.

A.1.3 Water Quality Engineering Consultation No. 32-66-0151-81, Aug. 18-25, 1980[32]

The purpose of this consultation was to collect and analyze samples from three PSF wastewater streams delivered to the San Francisco sanitary sewer system. The samples were analyzed for heavy metals concentrations and the results would be used by PSF in negotiations with the City of San Francisco on possible discharge limitations.

The City of San Francisco was concerned with the amount of heavy metals discharged to their wastewater treatment plant. As part of a program to check pollutant contributions by discharges into the city's system, the city, in 1978, sampled two PSF discharges. The levels of mercury and silver discharged from Letterman Army Medical Center (LAMC) were higher than the City desired; however, the City refrained from establishing any specific limits. Changes in hospital operations since the 1978 sampling may have reduced the heavy metals concentrations in the discharges. This consultation was conducted to provide new data and to provide guidance on reducing heavy metals concentrations, if necessary.

During this work, samples were collected from the two sanitary sewer manholes sampled by the City of San Francisco in 1978. These were the LAMC discharge and the LAMC and LAIR contributions to the total flow received by the city's sewer system. PSF is tied into the city's system at several points; however, the Trundy street discharge is served by a sewer collection system covering approximately 3/4 of the installation, including LAMC and LAIR.

Most of the sample analyses indicated that metals concentrations from the LAMC discharge and the combined LAMC and LAIR discharge had not changed significantly since 1978 with the exception of mercury. The mercury concentration had been substantially reduced to levels below the detection limit. This drop was probably due to changes in hospital operations. A major change, for example, was the replacement of mercury thermometers with electronic thermometers.

The concentration of silver showed little change from the 1978 concentration (0.10 milligrams per liter [mg/L] in 1978, to 0.14 mg/L in 1980). This concentration was reduced through dilution to less than 0.033 mg/L at the Truby Street discharge. At this concentration, it had no detrimental effect on the City's wastewater treatment plant. Most of the silver in LAMC's wastewater was coming from the fixer solution used in developing X-ray film. Although the silver concentrations in the wastewater were small, they indicated the silver recovery units were not operating as efficiently as desired.

In conclusion, the measured concentrations of heavy metals in the wastewater from the PSF were low and posed no problem to the City collection system or treatment plant. The low concentrations of silver in the wastewater could be reduced further by improving the efficiency of the silver recovery units at LAMC.

A.1.4 Water Quality Engineering Special Study (WZ) (Trihalomethanes in Drinking Water) No. 31-61-0196-82, Aug. 24-28, 1981[33]

The purpose of this study was to assess total trihalomethanes (TTHM) levels and formation potentials through the WTP and distribution system of PSF, and to evaluate

operational/treatment modifications necessary to achieve compliance with the USEPA's maximum contaminant level (MCL) of 0.1 mg/L. THMs are suspected carcinogens and are formed during the chlorination of surface (and occasionally ground) water. The TTHM MCL became effective Nov. 29, 1983 for systems serving 10,000 to 75,000 consumers.

Trihalomethanes are formed as follows: chlorine + (bromide ion or iodine ion) + precursors = trihalomethanes and other halogenated compounds. Chloroform is usually the most common THM found in the drinking water and it is also usually found in the highest concentration. Other constituents of the THM family of compounds that can be detected using current analytical technology are bromodichloromethane, dibromochloromethane and bromoform.

Water is supplied to PSF from three sources: surface water from Lobos Creek, groundwater from three wells adjacent to Lobos Creek, and water purchased from the City of San Francisco. Surface water from Lobos Creek is treated at the PSF WTP. Treatment consists of pre- and postchlorination (gaseous chlorine), sedimentation, sand filtration, and fluoridation (sodium silicofluoride). Filter backwash water flows by gravity to a reclamation system consisting of flocculation/ sedimentation chamber.

During this study, it was found that:

1. TTHM levels at PSF average below the USEPA's limit of 100 ppb, although THMs in outlying areas were in excess,

2. TTHM levels west of the Park-Presidio Boulevard (Region I) were consistently below the USEPA's limit and ranged between 50-65 micrograms per liter (µg/L) due to a short residence time in the system,

3. The long residence time of the distribution system and contact time with a free available chlorine (FAC) residual doubled TTHM levels leaving the WTP for regions east of the Park-Presidio Boulevard,

4. Increased use of City water would cause a beneficial dilution of nitrates, but would not necessarily reduce TTHM levels,

5. The most attractive treatment to reduce TTHMs is ammoniation of the finished water leaving the WTP (after disinfection in the clearwell),

6. Compliance with the USEPA's MCL is highly dependent on the selection of sampling locations, and

7. Although the increased use of groundwater to reduce TTHMs is possible, it would require a significant upgrade of the wellfield, may encourage salt water intrusion, and probably would not aid in reducing the already high nitrate levels.

This study recommended:

1. Insuring that any further TTHM sampling be conducted in accordance with Title 40 of Code of Federal Regulations (CFR), 1981 (National Interim Primary Drinking Water Regulations);

2. Investigating the use of a combined available chlorine (CAC) residual by ammoniation of the finished water after disinfection in the clearwell at the WTP, should TTHM reduction be necessary at PSF for compliance with the MCL. (These investigations should be conducted in cooperation with the U.S. Army Environmental Hygiene Agency [USAEHA] and relevant services.); and

3. Thoroughly investigating TTHM and THMFP (trihalomethane formation potential) in the city water system to project if increased use would be beneficial.

A.1.5 Potable/Recreational Water Quality Survey No. 31-66-0106-84, Oct. 11-15, 1983[34]

The purpose of this survey was to provide technical support and guidance to the Preventive Medicine Activity, LAMC in fulfilling its responsibilities for potable/recreational water, and to assist the Commander, PSF, in providing and maintaining adequate and safe potable/recreational water at the subject installation.

The drinking water at the PSF is a mixture of groundwater, surface water, and purchased water. The surface water is collected from Lobos Creek, a small stream which originates on the installation. It is prechlorinated, settled, filtered, and stored in a 1 million-gallon (MG) clearwell at the PSF WTP. The groundwater is not treated, but flows directly into the same clearwell at the WTP. This combined water is chlorinated and pumped to the distribution system and to two additional storage tanks (0.1 MG and 6 MG). The purchased water from the City of San Francisco normally flows directly into the 6-MG storage reservoir. Per capita water usage at PSF is about 350 gallons per day. Hospitals are heavy water users, and the doubling of water usage in the summer indicates irrigational and recreational uses.

The quality of the water at PSF is adequate based on the National Interim Primary and National Secondary Drinking Water Regulations (NIPDWR and NSDWR), with the exception of the TTHM concentration, which is generally near or above the NIPDWR MCL of 0.1 mg/L. This problem has been addressed previously, and it was the subject of a special study.

Lobos Creek provides the PSF with 72% of the average potable water consumption (1.6 million gallons per day). The creek originates primarily from groundwater seepage, which should not contain THM precursors. However, the entire length of the creek up to the PSF intake has very dense vegetation both in and along the creek. As the water flows through the dense growth, decaying organic matter enters it. Runoff from the surrounding area which enters the creek is also likely to be high in

organic content because of the presence of dense foliage in the vicinity of the Creek. The organic matter is very likely the source of the majority of the THM in the PSF finished water. Removal of the growth in the creek itself might alleviate most of the problem. A more practical alternative may be to further develop the aquifer and convert totally to groundwater.

Groundwater is collected from wells located near Lobos Creek, in the southwest corner of PSF. There are three functional wells which provide approximately 15% of the water used at the PSF. Drawdown gauges and flowmeters are provided for each well; however, they were all inoperative and needed to be repaired.

Water is purchased from the City of San Francisco to make up the deficit between PSF water production and demand. The PSF golf club uses city water. The TTHM content of the purchased water was shown to be about the same as PSF treated water. The total water purchased averages approximately 300,000 gallons per day, and accounts for about 13% of the water consumption at the PSF.

Of the installations surveyed (Forts Baker, Barry, Cronkhite, and Mason, and Camp Parks, Calif., as well as PSF), only the PSF has any recreational water under the control of the Army. The PSF has one swimming pool which is located at Bldg. 1511. It is a recirculating-type pool with a capacity of 160,000 gallons, and a total area of 4,000 ft^2. This pool was drained on October 28, 1983, for repairs. Prior to draining the pool, intermittent contamination from an unidentifiable source was observed during routine bacteriological monitoring. The pool was successfully superchlorinated, drained, cleaned and disinfected manually, refilled, and superchlorinated. Inspections by the PSF preventive medicine activity revealed a grossly contaminated hair catcher, which was promptly cleaned. The contamination disappeared for a short while, and then reappeared. The pressure filters were opened and found to be in poor condition. Some additional problems had reportedly been identified, including a leaking sewer main in the pool area, and possibly a cracked pool drain line which could admit contaminated water. These problems were under investigation.

The survey team concluded that PSF was experiencing problems with TTHM. A special study was performed by this Agency. The PSF swimming pool needed a great deal of work, and the work had been initiated. In general, the facility's chlorine safety needed to be improved.

A.1.6 Wastewater Engineering Survey No. 32-24-0502-84, Dec. 12-16, 1983[35]

This survey was conducted to evaluate facilities concerned with wastewater generation, treatment, disposal, and monitoring and to review discharge permit compliance and installation oil and hazardous substances spill control and contingency planning.

The PSF does not own or operate wastewater treatment facilities. All wastewater from this installation is handled by the City of San Francisco and is treated by the City's sewage treatment plant (STP). This was made possible by a 1935 agreement between the War Department and City of San Francisco which stated that the U.S.

Government could connect the sewer line of PSF into the City of San Francisco sewage collection line, without payment of any kind to the City. In exchange, the U.S. Government granted an easement for the right-of-way of a City sewer line across the Fort Mason Military Reservation. This easement was due to expire May 4, 1985.

In 1975, the City of San Francisco was mandated by the California Water Resources Control Board, Division of Water Quality, to upgrade its sewage collection system to comply with state water quality regulations. Part of this upgrade involved the construction of an outfall consolidation sewer across Fort Mason. This required another easement from the U.S. Government which was granted in 1976. The sewage line was constructed and is in operation. The National Park Service (NPS), however, maintained a provision of the easement agreement to continue to allow PSF, Fort Point, and Fort Mason to discharge sewage to the City of San Francisco's sewage collection system without charge. This continued privilege extends through the term of easement, which is due to expire August 26, 2006.

In reality, not all wastewater generated at PSF is treated without cost. Approximately 80% of all wastewater from PSF is treated without charge, per agreements. The remaining 20% of the wastewater is generated by facilities largely not in place at the time of the 1935 agreement. Specifically, enlisted and officer housing areas and the Golden Gate USARC. The PSF is charged a "flat rate" by the City of San Francisco for this wastewater treatment.

Wastewater is collected via various sizes and lengths of cast iron, reinforced concrete, and vitrified clay pipe. The wastewater composition is primarily domestic, from the approximately 18,000 resident and nonresident population. Wastewaters from other sources at PSF such as vehicle washracks, filter backwashes (from the water treatment plant and post swimming pool) and boiler plant blowdown are also connected to the sanitary sewer system. No infiltration and inflow study has been done on the PSF collection system.

Raw wastewater is pumped by force over some hilly sections of PSF. These wastewater lift stations did not have dependable emergency power generators. Thus, during the late fall to early spring, when coastal storms may be the most severe, lift stations malfunction or lose power from storm damage, resulting in backup of sewage. Most of the time, these backups overflow to a nearby storm drain or drainage ditch and eventually discharge to the Bay. This represents an unpermitted, illegal discharge of sewage to local receiving waters.

At the time of this survey, the only document available for review is the Part I, General Information Document, of the Spill Prevention, Control, and Countermeasure Plan (SPCCP). Both the SPCCP and the Installation Spill Contingency Plan (ISCP) were in the process of being revised.

With regard to spill prevention, one item was noted during this survey. Diking of a petroleum, oils, and lubricants (POL) storage pad area was found to be inadequate. The POL storage area adjacent to Bldg. 638 had a drain trough (to collect spillage) that does not completely followup to a concrete dike. Visible oil stains were present, indicating previous uncontained spills outside the storage paid area.

A.1.7 Water Quality Engineering Consultation No. 31-6-0130-84, Jan. 18-25, 1984[36]

The purpose of this consultation was to assist the Directorate of Engineering and Housing, PSF, in replacing the filter media in the sand filters at the WTP and to provide guidance to WTP personnel in optimizing the filter system operation.

During the potable recreational water quality survey (see Ref. 34), the team identified certain problems with the WTP sand filters. There was not enough room above the filter media to allow for adequate bed expansion during backwashing; the filter media appeared to be too coarse for adequate filtration; and the maximum backwash rate was 11 gpm/ft^2, which was appreciably less than the accepted rate of 15 gpm/ft^2, and did not provide the bed expansion necessary for good cleaning of the filter media.

Samples of the top layer of sand in the filters were collected and analyzed. The results of the sand analyses showed that the sand was not correctly sized.

A project was initiated to replace the media in the filters. The new filter media were properly placed in the sand filter structures, and the filters were adequately cleaned and disinfected before they were put into service. Some inadequacy remained in the ability to effectively backwash the filters because of limited drain capacity, but corrective action was initiated. An interim backwashing procedure was developed to optimize cleaning until the structural corrections to increase the drain capacity were completed.

A.1.8 Water Quality Engineering Study No. 31-66-0105-84, Jan. 26 - Feb. 12, 1984[37]

The purpose of this study was to determine and implement, where practical, operational changes that would reduce the TTHM concentrations to levels that met the National Interim Drinking Water Regulation Standards (NIDWRS).

An MCL of 0.10 milligram per liter (mg/L) for TTHM in drinking water has been established by the USEPA. This is equivalent to 100 parts per billion (ppb). A 1981 study and a sampling program conducted by U.S. Army Environmental Hygiene Agency (USAEHA) showed that the water treated at PSF WTP had frequently exceeded the MCL for TTHMs (see Ref. 33).

Prior to this study, the installation upgraded the WTP sandfilters and eliminated the filter backwash water supernatant return to the plant headworks. The backwash water is now discharged to the sanitary sewer system. These operational changes enhanced the treatment provided and aided the reduction of TTHM at the WTP.

The use of chloramines as a disinfection agent is an effective method of reducing TTHM production. Chloramine disinfection was not evaluated. However, California State Health Department officials will not approve the use of chloramines as primary disinfectants.

This survey concluded that compliance with the NIPDWR standard for TTHM had been achieved by eliminating prechlorination of water and by using alum as a primary coagulant in conjunction with midpoint and postchlorination. Installation personnel were operating the WTP in this configuration. The study concluded that further reduction of the TTHM concentrations could be achieved by implementing the recommendations included in the study.

Recommendations were (1) to continue to operate the WTP without prechlorination and without alum used as a primary coagulant in conjunction with midpoint and postchlorination; and (2) to maximize the use of Well No. 13, reduce the volume of water in the 6-MG reservoir to 2 MGs, clean the two storage facilities within the distribution system, implement an annual water-main flushing program, and implement a TTHM monitoring program within the WTP and distribution system.

A.2 HAZARDOUS WASTES/HAZARDOUS MATERIALS STUDIES

A.2.1 Solid Waste General Survey No. 26-B04-75/76, LAIR/PSF, April 30, 1975[38]

The purpose of this survey was to evaluate current solid waste management practices, to develop information for possible improvement of management techniques, and to provide guidance on existing solid waste storage, collection, transfer, recycling and disposal practices.

Letterman Army Institute of Research (LAIR) is a tenant activity of the PSF. At the time when this survey was conducted, 323 persons were working at LAIR. However, it was estimated that 532 working personnel would be required when LAIR reached full scale operation.

The mission of LAIR is to provide a general medical research capability and conduct research in the areas of nutrition, infectious diseases, dermatology, surgery, blood transfusion, laser safety, and experimental psychology.

It was found through this survey that solid waste generation at LAIR averaged approximately 352 uncompacted cubic yards per month, assuming 22 working days per month. Quantities of solid waste were estimated volumetrically from storage containers which, from experience, were known to be full at the time of collection. The estimated generation figure included all type "O" waste (trash: a mixture of highly combustible waste such as paper, cardboard, cartons, wood boxes, and combustible floor sweepings from commercial and industrial activities) generated at LAIR plus some type "4" waste (human and animal remains, such as organs, carcasses, and solid organic wastes from hospitals, laboratories, and similar sources, consisting of up to 85% moisture and 15% combustible solids).

Solid waste storage at LAIR was found to consist of two 8-cubic-yard dumpsters which were being filled each day. It was expected that in the near future, more storage containers would be required to meet the needs of LAIR as it was reaching full operational capacity. During this survey, it was pointed out that compaction of bulky

material such as boxes and cartons was not being carried out by all LAIR personnel to greatly reduce required storage capacity.

Collection and transportation of solid waste at LAIR was accomplished through the Directorate of Facilities Engineering (DFAE) at PSF. DFAE had arranged for refuse collection to be provided by a commercial contractor (U.S. Eagle, Vacaville, Calif.). The refuse was collected daily and disposed of by the contractor at Western Contra Costa County sanitary landfill, a Class I and II disposal site located in Richmond, Calif.

Classified waste generated at LAIR was destroyed in a paper shredder owned and operated by LAMC. The shreddings were disposed of along with the general refuse. Solid waste generated from this source was minimal (less than 20 pounds per month).

Pathological waste, consisting of dead animals which had been used for test purposes, was destroyed in the LAIR pathological waste incinerator. The incinerator has a rated capacity of 200 lbs/hr and was used approximately one day per week for 6 hours. The ashes were disposed of along with the general refuse.

Small amounts of waste oil from laboratory compressors were collected and stored in a 55 gallon drum. Approximately one to two drums of the waste oil were collected per year. Waste oil at PSF was collected and recycled by a commercial contractor retained by the DFAE.

A certain amount of animal waste was generated every year. In order for LAIR to conduct the research required by the mission statement, a large number of test animals are needed. Table A-1 gives the approximate number of animals on hand at the time this survey was made.

The cages for the majority of the larger animals (rabbits, chickens, subhuman primates, e.g.) were equipped with automatic or manual flush systems which were connected to the sanitary sewer system. Waste products from the animals were caught on a tray positioned below the bottom of the cages. Intermittently the trays were washed with rinse water which flowed over the trays to a collecting trough connected to the sanitary sewer.

TABLE A-1 Number of Test Animals at LAIR during April 1975

Animal	Number	Animal	Number
Guinea pigs	60	Rabbits	100
Dogs	100	Rats	600
Mice	300	Cats	40
Chickens	300	Hamsters	200
Swine	3	Sheep	10
Subhuman primates	100	Turtles	10

Most of the smaller animals were kept in cages with solid litter bedding. The solid litter was put in plastic bags and disposed of along with the general refuse. The empty cages were then washed in automatic washers at a temperature of 180°F using a strong detergent with an acid rinse.

Research on infectious diseases transmitted by vectors was being conducted at LAIR. The work was mainly done on small animals kept in cages having solid litter bedding. When the animals were transferred to clean cages, the soiled cages were immediately autoclaved. After sterilization the cages were then cleaned as described above.

Syringes used in the laboratories were broken in a syringe destruction box and then sent to LAMC where they were disposed of along with LAMC contaminated waste.

Infectious wastes consisting of bandages and dressings used on the animals were found to be disposed of along with the general refuse. It was noted, however, that applicable Army regulations require that infectious waste be incinerated or sterilized whenever feasible unless exceptions are approved.

Approximately 240 cubic feet of radioactive waste was generated per quarter in the LAIR laboratories. This material consisted of paper, glass, plastic, biological substances, liquid, and other laboratory waste products. The radioactive waste material was found to be collected and stored in accordance with applicable Army regulations. Approximately every three to four months the stored waste material was collected by Nuclear Engineering Co., Inc., Louisville, Ky., a commercial disposal company contracted by the U.S. Army Technical Support Directorate, Edgewood Arsenal, Md.

No pesticides were used at LAIR, and no salvage operations were conducted.

A.2.2 Waste Management Practices Survey No. 66-0169-78, Dec. 9-12, 1977[39]

The purpose of this survey was to gather data concerning the solid waste management practices at PSF. This information was to be used to program studies and investigations where technical advice and assistance were required and to develop a data base of waste management practices in the U.S. Army.

It was found through this survey that the sludge derived from back washing the filters of WTP was discharged into the City of San Francisco sanitary sewer system. Furthermore, the sanitary sewage from PSF is discharged into the City's sewer system. No industrial treatment of wastewater occurred on post. A series of seven grease and oil interceptors existed at various locations on post and these were emptied by contractors and disposed of at the city/county landfill.

It was found that a listing of the pesticides and their location of storage on the installation existed in the Solid Waste Management Questionnaire. On the other hand, a comprehensive inventory of hazardous materials did not as yet exist.

Two inactive and one active incinerators existed on post. The active incinerator was located in Bldg. 1110, LAIR. Animal remains were the only type of waste burned in this incinerator and the ash was hauled to an off-site landfill by a contractor.

The infectious and pathological wastes from LAMC were collected separately from the general refuse. The wastes were double-bagged and stored outside the hospital in a locked, concrete storage area until the contractor hauled them to the Richmond Class I sanitary landfill. The wastes were disposed of daily. However, this practice for the disposal of pathological waste (human tissue) was generally considered unacceptable for religious and aesthetic reasons. Sufficient capacity for the incinerator of pathological waste existed at the nearby LAIR incinerator; therefore, LAMC officials investigated the possible utilization of the LAIR incinerator for pathological waste incineration. (It is not known whether the LAIR incinerator was ever used for this purpose.)

This survey concluded that a comprehensive inventory of all hazardous materials stored at the installation was in the process of being prepared by the PSF staff; the land filling of the LAMC pathological waste was an unacceptable and unnecessary practice, and these wastes could be incinerated at the LAIR incinerator; and all other solid waste management practices at PSF were satisfactory.

A.2.3 Installation Pest Management Program Review No. 16-66-0516-80, Nov. 13-16, 1979[40]

The purpose of this review was to evaluate the PSF pest management program including the control of medically and economically important pests, and to provide recommendations for improving program effectiveness and correcting health and environmental hazards. The review focused on: pesticide usage, management, and records; respiratory protection; pesticide storage facilities; change room and shower; pesticide dispersal equipment; cockroaches; mosquitoes; weeds; rodents; raccoons; and integrated pest management.

The Entomology section of PSF (within the DEH) has a standing operating procedure for pest control on file which has been reviewed and approved by the FORSCOM entomologist. It has developed the ISCP which establishes procedures to be employed to contain and cleanup accidental pesticide discharges. In addition, the installation the SPCCP identifies bulk quantities of liquid pesticides in storage and measures required to prevent and contain discharge of these hazardous materials. The Entomology Section maintains an inventory of pesticides stored at PSF.

During this review, it was found that seven gallons of the weed killer silvex (2,4,5-trichlorophenoxy propionic acid) (245-T) were on hand at the storage facility next to Bldg. 269. The USEPA had issued an emergency order effective February 28, 1979, which suspended the registration of silvex for forest, right-of-way, pasture, home and garden, commercial and ornamental turf, aquatic, and ditch bank weed control.

A written document to specify procedures and responsibilities for the PSF Respiratory Protection Program had not been prepared at the time this review was conducted. Supervisors and workers were not instructed and trained in the selection, use, care, and maintenance of respiratory devices.

The herbicide storage facility (next to Bldg. 269) was found to be secure, dry, fire resistive, and of a single purpose; however, this facility lacked ventilation, the outside of the building was not labeled with "danger," "poison," "pesticide storage," and local fire department hazard signal signs. The insecticide storage facility (Bldg. 293) was found to be secure, dry, fire resistive, and of single purpose; however, this facility lacked ventilation, and a list of the types of chemicals stored in the building was not posted on the outside as required.

Pesticide dispersal equipment was found to be properly cleaned and maintained. The trucks used for pest controllers had lockable storage areas.

It was found that an Integrated Pest Management (IPM) program was in effect at PSF with the purpose of minimizing the effects of pesticides on the environment. IPM practices on the installation included mowing weeds as a means of control, structural improvements to buildings to deny entry to rodents, filling low spots and clearing obstructions to eliminate and/or reduce mosquito breeding, using sanitation to suppress pest infestation in and around food service facilities and other buildings, and basing pest control measures on surveillance results.

A.2.4 Hazardous Waste Management Survey No. 37-26-0300-83, Feb. 14-17, 1983[41]

The purpose of this survey was to evaluate operations dealing with storage, transport, disposal, and recycling of hazardous wastes, and to assist in the development of an overall PSF management plan for hazardous waste.

The PSF is a permitted generator of hazardous waste (HW) (ID No. CA 7210020791 granted in January 1980). The PSF Regulation No. 200-1, Hazardous Waste Management, was implemented in January 1982, establishing policies, procedures, and responsibilities for management of hazardous wastes. A Spill Prevention, Control, and Countermeasure Plan was implemented on January 5, 1983.

In general, the PSF was found to have a current inventory of all HW generated. The Defense Property Disposal Office for PSF is located in Alameda, Calif., 25 miles away. The PSF generated a relatively small amount of HW. Consequently, the collection of all HW was contracted out through the Environmental Office, DEH (which was then DFE), and picked up at five strategically located sites on the base. The Environmental Office had been successful in getting the installation to identify and remove unserviceable and excess hazardous materials.

Most spent cleaning solvents at PSF were disposed of in conjunction with used oil. Oil-water mixtures and sludge from large oil-water separators were removed and disposed of by HW contractors. Small separators were cleaned by installation personnel, with sludge removed to 55-gallon drums for disposal by an HW contractor.

A large number of concrete floors situated in logistics warehouses and in supply and service buildings throughout the installation demonstrated evidence of chemical and hazardous materials spills. It was recommended that these key heavily used areas (floors) be epoxy sealed to limit absorption into the porous concrete floors and subsequent contamination.

At several warehousing locations, damaged and leaking stocks or wastes were observed awaiting disposition. It was recommended that spill containment boxes be available for use to eliminate contamination of floor and adjacent stocks.

Stoddard Solvent, Type I, was the primary parts-cleaning solution used at PSF at the time of this survey. The USAEHA survey team observed eighteen 55-gallon drums at the POL yard. Buildings 924, 926, 937, 283, and 643 used this solvent for cleaning repair parts. The spent solvent was being mixed with waste oil before disposal. Some degreasing solvents are listed or characterized as HWs by Resource Conservation and Recovery Act of 1976 (RCRA). The mixing of these solvents with used oil, therefore, made the entire mixture a hazardous waste which had to be managed in accordance with RCRA regulations.

The collection point for storage batteries at PSF was Bldg. 926. An average of 30 batteries/month were palletized for ultimate disposition at DPDO, Fort Baker. The survey team observed five pallets of cracked and leaking batteries (approximately 100) stored outside Bldg. 926 on an unbermed asphalt-base pavement. The use of spill containment boxes was necessary during transporting and short-term storage of leaking batteries.

Building 931 stored vehicle paints and thinners. The roof leaked severely. Paint cans that were delivered 6 months ago had already rusted. Xylene was stored in this building, too. Xylene is a required thinner for camouflage paints.

Building 924 had a large quantity of lube oils and greases, along with a small amount of flammables such as methyl ethyl ketone, naphtha, alcohol, and acetone.

Building 640 received DOL materials. Hazardous materials were transported to Bldg. 634. Materials were stored on pallets and shelves. The building did not contain spill cleanup and containment equipment or personal protective equipment. Minor problems were observed in storing HW in a compatible manner.

Land management chemicals (pesticides, herbicides, e.g.) for the installation were stored and mixed in Bldg. 269. The mixing area was ventilated, bermed, and contained all necessary personal protective equipment. The rinsate solutions were drained to an outside storage tank. Disposal of the solution was by commercial contract.

Leaking or unserviceable transformers awaiting PCB test results were stored in a secured, enclosed, concrete-bermed floor structure near Bldg. 680. Transformers exceeding the disposal PCB concentration limit were removed by a HW contractor.

The survey team found six 55-gallon drums containing a mixture of used oil and cleaning solvent stored outside the bay doors of the Mobile Shop, Bldg. 283. The area was unbermed and extremely oil stained. Leak troughs were not being used.

Asbestos taken from boiler and pipe coverings was dampened with water and triple-bagged by trained DFAE personnel and landfilled at the installation.

Both LAMC and LAIR collectively generated approximately 1,300 pounds of solid and 300 gallons of liquid chemical wastes including halogenated and nonhalogenated

solvents, concentrated acids and bases, reactive acids and metals, oxidizers, carcinogens, etc. Identified and quantified HW were collected in 1 gallon or less containers which were stored at the generation site in a fire-resistant chemical cabinet and then transported monthly by vehicle to Bldg. 630. A commercial contractor was removing the HW.

Building 630 was the HW storage facility for LAMC. The inside appearance of this metallic building suggested rain leakage. Spill cleanup and containment equipment and personal protective equipment were not available.

Chemical laboratory areas had fully equipped cleanup and containment gear and personal protective equipment. Personnel were knowledgeable of emergency spill responses and management of HW.

The HW at LAIR were stored in the same manner as HW at LAMC. However, the HW remained at the generation site until a pickup notice from the HW contractor was received.

A.2.5 PCB Sampling and Analysis Report, Feb. 9, 1987[41]

The objective of this work was to establish the initial lateral limits and levels of PCB contamination at each of three sites at PSF. In order to accomplish this objective, field work involving the collection and analysis of concrete core samples, concrete surface samples, wipe samples, and soil samples were performed by American Environmental Management Corporation (AEMC) and the Eureka Laboratories, both of Sacramento, Calif. The report also included interpretation of the analytical results. This interpretation is summarized in the following paragraphs.

The sites sampled at PSF included areas adjacent to or within Bldgs. 1040, 680, and 1151. Figures A-1, A-2, and A-3 show the PCB-sampling locations at Bldgs. 1040, 680, and 1151, respectively. All sites were used by the Army to store electrical equipment, including PCB transformers. Two of the sites (near Bldgs. 1040 and 1151) consisted of fenced concrete equipment pads, while the other (Bldg. 680) consisted of an enclosed storage building with a concrete lined floor. The number and types of samples collected at each site were predetermined by the Army. Exact sampling locations at each site were chosen by AEMC field personnel. Areas where oil contamination was visually evident were chosen as sampling locations.

Three 3-increment concrete core borings were drilled at the buildings for a total of nine borings. Drilling was completed through the concrete floor or equipment pad at each location.

Eleven concrete and liner wall surface samples were also collected; four from Bldg. 1040, three from Bldg. 680, and four from Bldg. 1151. Samples were obtained from a 10 cm x 10 cm square. Approximately 1/8 to 1/4 of the surface was removed at each surface sample location. Twelve wipe samples were collected; six from Bldg. 1040, and six from Bldg. 1151.

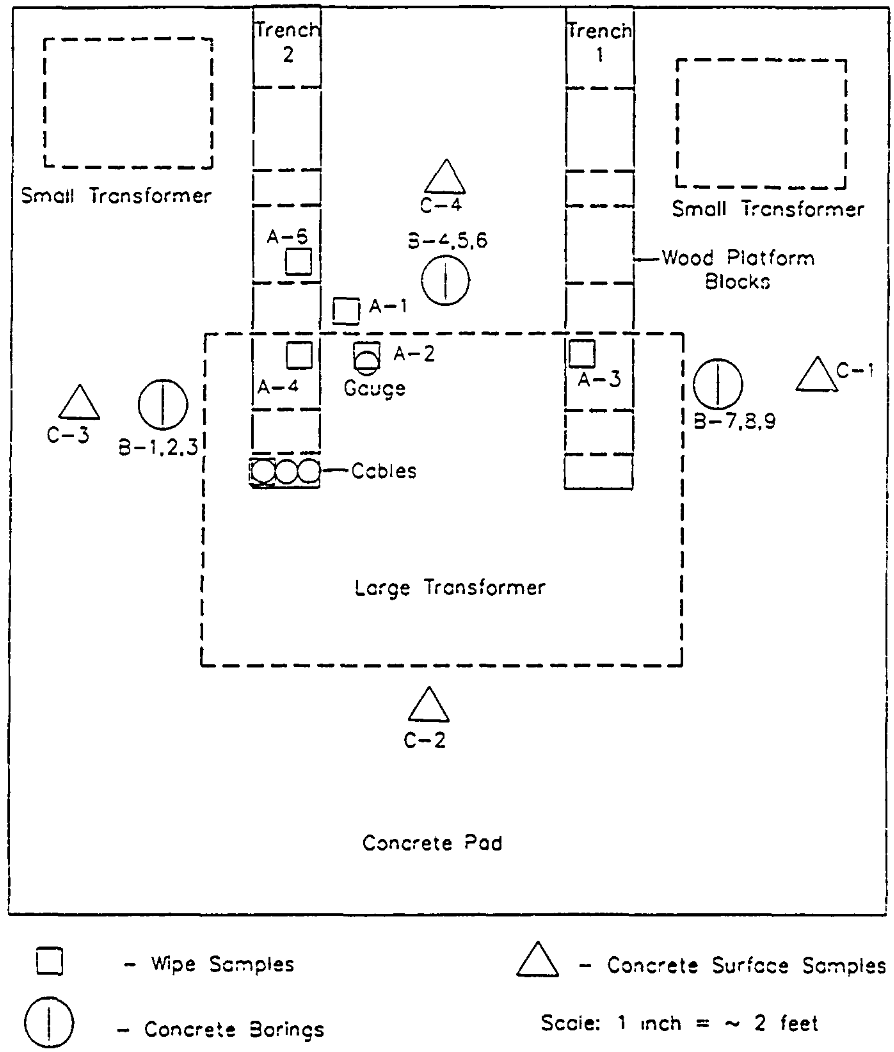

FIGURE A-1 PCB-Sampling Locations at Bldg. 1040, PSF

A total of 14 soil borings, six at Bldg. 1040, and eight at Bldg. 1151, were also completed as part of this study. All borings were 18 inches in depth and the resulting samples represented a full-depth composite.

All samples were delivered to Eureka Laboratories (State Certification # 180) of Sacramento, Calif., with chain-of-custody documentation. All samples were analyzed for PCBs using approved USEPA methods (USEPA Method 8080).

Analytical results indicated that PCB contamination was evident at all sites with Arochlor 1260 being the only PCB isomer present. (Arochlor is a tradename of PCB fluids manufactured by Monsanto Corporation. The last two digits of the numerical designation represent a weight percent of total chlorine present.) Tables A-2, A-3, and A-4 show the analytical results for samples taken at Bldgs. 1040, 680, and 1151, respectively.

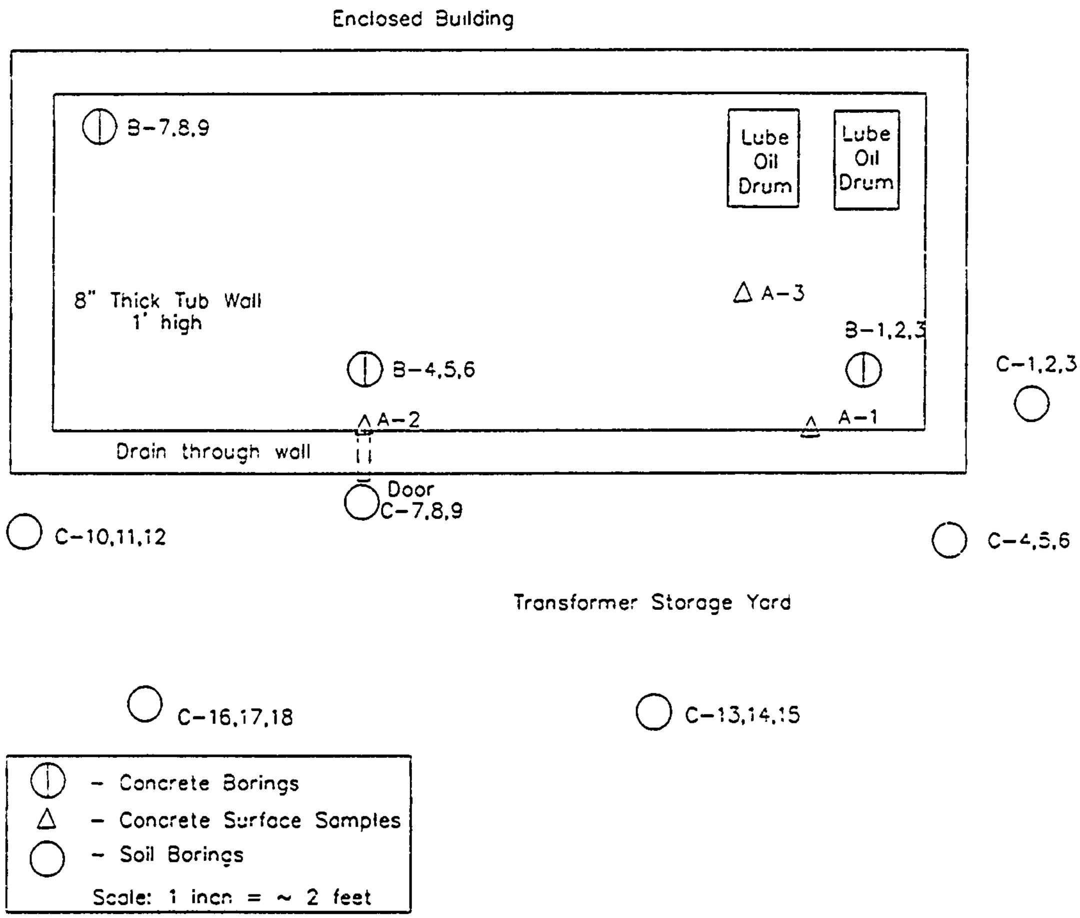

FIGURE A-2 PCB-Sampling Locations at Bldg. 680, PSF

In Bldg. 1040, analytical results of the wipe samples indicated contamination on the concrete pad as well as the large transformer body, the trench walls, and connecting cables. The greatest concentration of PCBs was found on the transformer body. Concrete core analyses showed that PCB concentrations at the base of the concrete pad exceeded the 50 ppm total threshold limit concentration (TTLC) for PCBs. Thus, the contaminated concrete pad is to be considered hazardous by Title 22 of the California Administrative Code. In addition, PCB concentrations in the concrete tended to increase with depth, indicating the possibility of additional contamination in the soils beneath the pad. Concrete surface sampling results also indicated the presence of isolated contamination where the TTLC was exceeded.

In Bldg. 680, analytical results from both the concrete core samples and the liner surface samples indicated very low concentrations (less than 1 ppm) in the concrete. Soil sample analytical results showed that PCB was present mostly on the surface, near the entrances to the building and in front of :e building. However, all concentrations fell below 1 ppm.

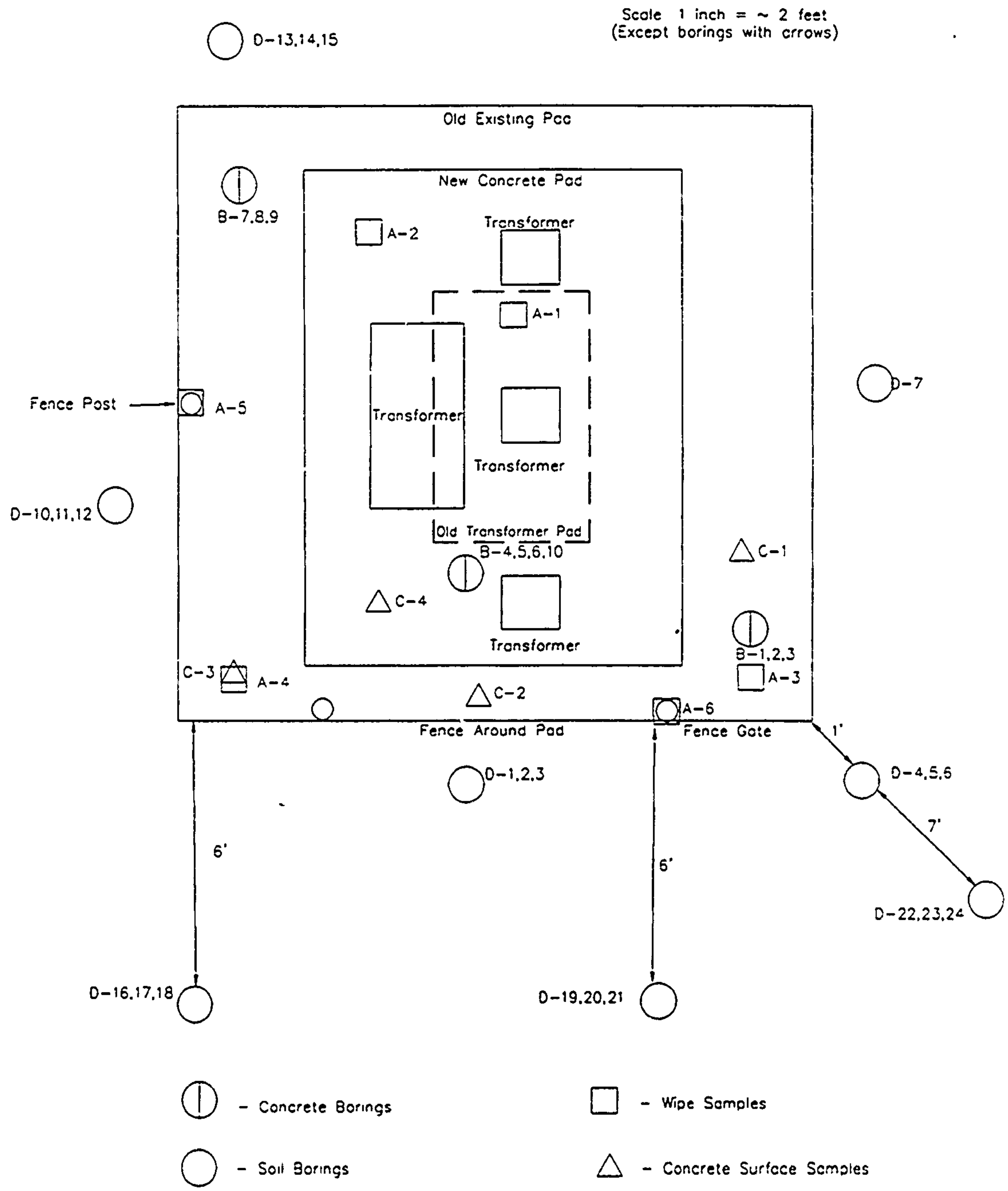

FIGURE A-3 PCB-Sampling Locations at Bldg. 1151, PSF

In Bldg. 1151, wipe sample analytical results indicated low to moderate concentrations of PCB (4 to 94 μg/100 sq cm) on the equipment pads as well as some low concentrations on the fence posts. Results for the concrete core samples indicated low PCB concentrations (5 ppm or less) in the concrete pads, with highest concentrations occurring in the upper four inches of the pads. Surface sample results, however, did indicate an isolated hot spot on the lower left corner of the newest concrete pad. PCB concentrations at this location exceeded the TTLC. Soil sample results also indicated low concentrations of PCBs (from 0.1 to 3.9 ppm) in the soil around the main concrete pad with greatest concentrations occurring near the front of the pad.

TABLE A-2 Building 1040 Analytical Results Summary

Sample		Location	PCB (μg/ 100 cm^2)
Wipe Samples			
A-1		Concrete pad	317
A-2		Transformer surface (below gauge)	51,600
A-3		Trench #1 wall	14,740
A-4		Trench #2 wall	25,600
A-5		Cable in Trench #2	4,045
A-6		Wooden platform blck	26,060
		Depth (inch)	PCB (ppm)
Concrete Core Samples			
B-1	First	0 - 4	28
B-2	boring	4 - 8	0.13
B-3		8 - 12	55
B-4	Second	0 - 2 1/2	N.D.[a]
B-5	boring	2 1/2 - 5 3/4	40
B-6		5 3/4 - 8	57
B-7	Third	0-3	1.7
B-8	boring	3 - 5 3/4	N.D.
B-9		5 3/4 - 8	0.6
		Thickness (inch)	PCB (ppm)
Concrete Surface Samples			
C-1		1/8 - 1/4	17
C-2		1/8 - 1/4	140
C-3		1/8 - 1/4	9
C-4		1/8 - 1/4	288

[a]Not detected, less than 0.1 ppm.

TABLE A-3 Building 680 Analytical Results Summary

Sample		Depth (inch)	PCB (ppm)
Concrete Core Samples			
B-1	First	0 - 3	N.D.[a]
B-2	boring	3 - 7 1/2	N.D.
B-3		7 1/2 - 11 1/2	0.3
B-4	Second	0 - 3	N.D.
B-5	boring	3 - 7	N.D.
B-6		7 - 11 1/2	N.D.
B-7	Third	0 - 3 1/2	0.2
B-8	boring	3 1/2 - 7	N.D.
B-9		7 - 10	0.6
		Thickness (inch)	PCB (ppm)
Concrete Tub Wall Samples			
A-1		1/8 - 1/4	0.4
A-2		1/8 - 1/4	0.2
A-3		1/8 - 1/4	0.11
		Depth (inch)	PCB (ppm)
Soil Boring Samples			
C-1	First	0 - 6	N.D.
C-2	boring	6 - 12	N.D.
C-3		12 - 18	N.D.
C-4	Second	0 - 6	0.13
C-5	boring	6 - 12	N.D.
C-6		12 - 18	N.D.
C-7	Third	0 - 6	0.4
C-8	boring	6 - 12	N.D.
C-9		12 - 18	N.D.
C-10	Fourth	0 - 6	0.6
C-11	boring	6 - 12	N.D.
C-12		12 - 18	N.D.
C-13	Fifth	0 - 6	N.D.
C-14	boring	6 - 12	N.D.
C-15		12 - 18	0.7
C-16	Sixth	0 - 6	0.8
C-17	boring	6 - 12	N.D.
C-18		12 - 18	N.D.

[a]Not detected, less than 0.1 ppm.

TABLE A-4 Building 1151 Analytical Results Summary

Sample	Location	PCB (μg/100 cm^2)
Wipe Samples		
A-1	Old pad under removed transformer	94
A-2	Corner of new pad	5
A-3	Low spot on old existing pad	78
A-4	Low spot on old existing pad	20
A-5	Lower side of fence post	4
A-6	Lower side of fence gate post	16
	Depth (inch)	**PCB (ppm)**
Concrete Core Samples		
B-1 First	0 - 3 1/2	5
B-2 boring	3 1/2 - 7 1/2	3
B-3	7 1/2 - 12 1/2	2.2
B-4 Second	0 - 4	0.6
B-5 boring	4 - 8	2
B-6	8 - 13	4
B-10	13 - 17	0.9
B-7 Third	0 - 4 1/2	1.2
B-8 boring	4 1/2 - 9 1/2	0.4
B-9	9 1/2 - 14 1/2	0.6
	Thickness (inch)	**PCB (ppm)**
Concrete Surface Samples		
C-1	1/8 - 1/4	5.7
C-2	1/8 - 1/4	22.0
C-3	1/8 - 1/4	12
C-4	1/8 - 1/4	169
	Depth (inch)	**PCB (ppm)**
Soil Boring Samples		
D-1 First	0 - 6	2.6
D-2 boring	6 - 12	0.4
D-3	12 - 18	2.0
D-4 Second	0 - 6	1.6
D-5 boring	6 - 12	0.4
D-6	12 - 18	3.3

TABLE A-4 (Cont'd)

Sample		Depth (inch)	PCB (ppm)
Soil Boring Samples (Cont'd)			
D-7	Third	0 - 6	0.3
D-8	boring	6 - 12	0.12
D-9		12 - 18	N.D.[a]
D-10	Fourth	0 - 6	1.9
D-11	boring	6 - 12	0.2
D-12		12 - 18	0.7
D-13	Fifth	0 - 6	3.9
D-14	boring	6 - 12	0.2
D-15		12 - 18	0.2
D-16	Sixth	0 - 6	0.11
D-17	boring	6 - 12	N.D.
D-18		12 - 18	N.D.
D-19	Seventh	0 - 6	0.3
D-20	boring	6 - 12	N.D.
D-21		12 - 18	0.5
D-22	Eighth	0 - 6	N.D.
D-23	boring	6 - 12	N.D.
D-24		12 - 18	N.D.

[a]Not detected, less than 0.1 ppm.

A.3 GEOHYDROLOGIC INVESTIGATIONS

A.3.1 Geohydrologic Consultation No. 24-0119-78, June 26-30, 1978[24]

The objectives of this study were to interpret the geohydrologic setting of PSF with respect to physiography, soils, geology, and the occurrences and quality of groundwater. A secondary objective was to use these findings to determine the source of continuing nitrate problems with raw groundwaters withdrawn from wells on PSF.

The study characterizes the physiographic setting of the San Francisco Peninsula (on which PSF resides) as gently rolling to hilly topography, with most slopes below 5% and elevations from sea level to about 400 feet above mean sea level. Soils consist of mainly the Colma Formation, Slope Debris, Dune Sand, and Artificial fill and Modern Beach Deposits with maximum depths reaching 80 feet. The Colma formation consist of variable permeable light brown to gray, unconsolidated fine to medium sand with small to moderate amounts of silt and clay. The slope debris consists of angular rock fragments

in a sand-silt-clay matrix. Dune sand predominates in the southwestern third of PSF while artificial fill and modern beach deposits are found in the northern 10% of PSF.

Bedrock geology is described as highly complex, and containing one relatively short, probable fault which extends southeastward from just north of Baker Beach, and one northwest-southeast trending shear zone cutting diagonally through PSF. The closest active fault, the San Andreas, is located approximately 7 miles southwest of PSF.

The usable groundwater systems below PSF are said to all be contained within Dune sand formations. Bedrock yields very little groundwater due to generally low permeabilities. Although some groundwater is said to recharge Lobos Creek, at the southwestern portion of PSF, the great majority ultimately flows to the Pacific Ocean or the San Francisco Bay.

The potable water system at PSF is described as a combination of surface water from Lobos Creek (70%), groundwater from wells located in the southwestern portion of PSF (20%) and water purchased from the City of San Francisco. Water supply wells for the potable water system are located near the water treatment plant in the southwest portion of PSF. Currently there are six active wells, numbers 1, 2, 3, 4, 6, and 13. The locations of these wells are shown in Fig. 2-7 and pertinent well information is included in Table A-5. At the time of this study (1978), all six wells were being pumped on a continuous basis for a total cumulative yield of 0.9 MGD. No well construction information is available. Furthermore, no information was provided in the study regarding other wells which have at one time been operational in this well field (apparent from the well numbering system).

The general direction of groundwater flow at this well field is northwest, toward the Pacific Ocean. However, investigators noted that draw-downs of some wells can bring groundwater table levels down to four to nine feet below mean sea level. Concerns were expressed by the investigators that such a condition would promote salt water intrusion, but it was noted that pumping rates from this well field have been generally unchanged since the field was developed in the early 1900s and that no salt water intrusion problems had thus far been noted. Concerns remain for such problems to occur, should the well field be developed with additional wells and the cumulative pumping rates substantially increased. (PSF personnel report that no new wells have been added to this well field since its original construction.)

The study also noted other ground water supply wells on PSF in the vicinity of Mountain Lake in the south central portion of PSF. These wells, however, have only been used to supply nonpotable water to the PSF golf course for irrigation purposes. (In the past, the golf course has used water from the main PSF reservoir, the city of San Francisco pipeline, and Mountain Lake for irrigation.) Irrigation rates of approximately 0.25 MGD are apparently met by three wells located north of Mountain Lake. However, at the time of the study, only one of these wells was operational. The status of the two remaining wells was not noted, but DFAE personnel had reported that both wells needed to be replaced. The remaining active well is located in Bldg. 316 and has a capacity of 298 gallons per minute. Water recovered from this well is used for irrigation without any treatment.

TABLE A-5 Potable Water Well Data, PSF

Well Number	Building Number	Age	Pump Type	Depth (ft)	Yield[a] (gal/min)	Specific Capacity[b] (gal/min/ft of drawdown)	Static Water Level[b] (feet below surface)	Pumping Depth[c] (feet above surface)	Surface Elevation (feet above sea level)
1	1788	Circa 1919	Air lift	97	133	Unknown	Unknown	Unknown	62
2	1784	Renovated in 1978	Turbine	115	117	3.2	11.0	48	40
3	1789	Circa 1919	Air lift	68	131	Unknown	Unknown	Unknown	68
4	1783	Unknown	Turbine	70	20[d]	0.574	14.0	49	40
6	1780	Renovated in 1978	Turbine	62	48	1.71	9.2	37	28
13	1785	1971	Turbine	110	175	1.655	18.0	56	52

[a]Based on DFAE operating data.

[b]Based on pumping tests performed by Pacific Gas and Electric Company on April 14, 1977.

[c]Calculated by dividing the yield by the specific capacity to obtain drawdown and then adding that to the static water level.

[d]Flow is not steady.

The study concludes that more studies are needed to support any decisions on expanding PSF's current utilization of groundwater. Pumping tests and field observations should be conducted to determine static and pumping levels, specific capacities, and aquifer coefficients of transmissivity, storage, and permeability.

Finally, the study concludes that nitrate contamination of groundwater under PSF may be coming primarily from off-post sources. Analytical results are presented in Table 2-3. It was noted that groundwater recovered from the irrigation wells north of Mountain Lake show different contamination characteristics than does water recovered from the potable water wells. These differences are believed due to the fact that the irrigation wells are most likely drawing from a different, and deeper geologic formation than the potable wells. (However, no specification on irrigation well construction was provided to support that thesis.)

A.3.2 Geohydrologic Study No. 38-26-0451-84, Feb. 27 - March 7 and May 14-22, 1984[7]

The purpose of this study was to evaluate the geohydrologic conditions, determine the extent of groundwater contamination from Bldg. 937 (a vehicle maintenance shop located in the northern area of PSF), and recommend a remedial action plan which would ensure compliance with regulatory requirements.

Inside Bldg. 937 was a drain pipe which led to an underground storage tank adjacent to the building. In November 1981, an area inside the building near the drain pipe was excavated for the installation of a hydraulic vehicle lift. During the excavation, a thick (8 to 72 inch) layer of petroleum product was found under the foundation and on the surface of the groundwater which was only a few feet below grade. Inspection of the pipe and storage tank showed the pipe to be broken and perforated, while the storage tank was intact. All leakage was attributed to the broken pipe. A sample of the bulk oil overlying the groundwater was analyzed by EAL Corporation (2030 Wright Avenue, Richmond, Calif.) for organic priority pollutants. Various volatile organic compounds were detected as well as some base/neutral and acid extractable organic compounds. Following the discovery of oil in the subsurface, 10 monitoring wells were drilled close to the tank. Although some groundwater quality data were available from these monitoring wells, they could not be utilized during this study.

EAL Corporation drilled 23 groundwater monitoring wells in and adjacent to Bldg. 937, during a two-phase field effort. The locations of these are shown in Fig. A-4. Based on geologic and groundwater data, groundwater beneath the Bldg. 937 area is bound on the west and east by low permeability boundaries and on the other two sides by hydraulic boundaries. The shallow aquifer in the study area receives very minor recharges from the serpentine geologic unit beneath Bldg. 937 and very little from rainfall because most of the area is paved and is serviced by storm sewers. Due to the boundary conditions in the vicinity the groundwater under Bldg. 937 was concluded to be virtually static.

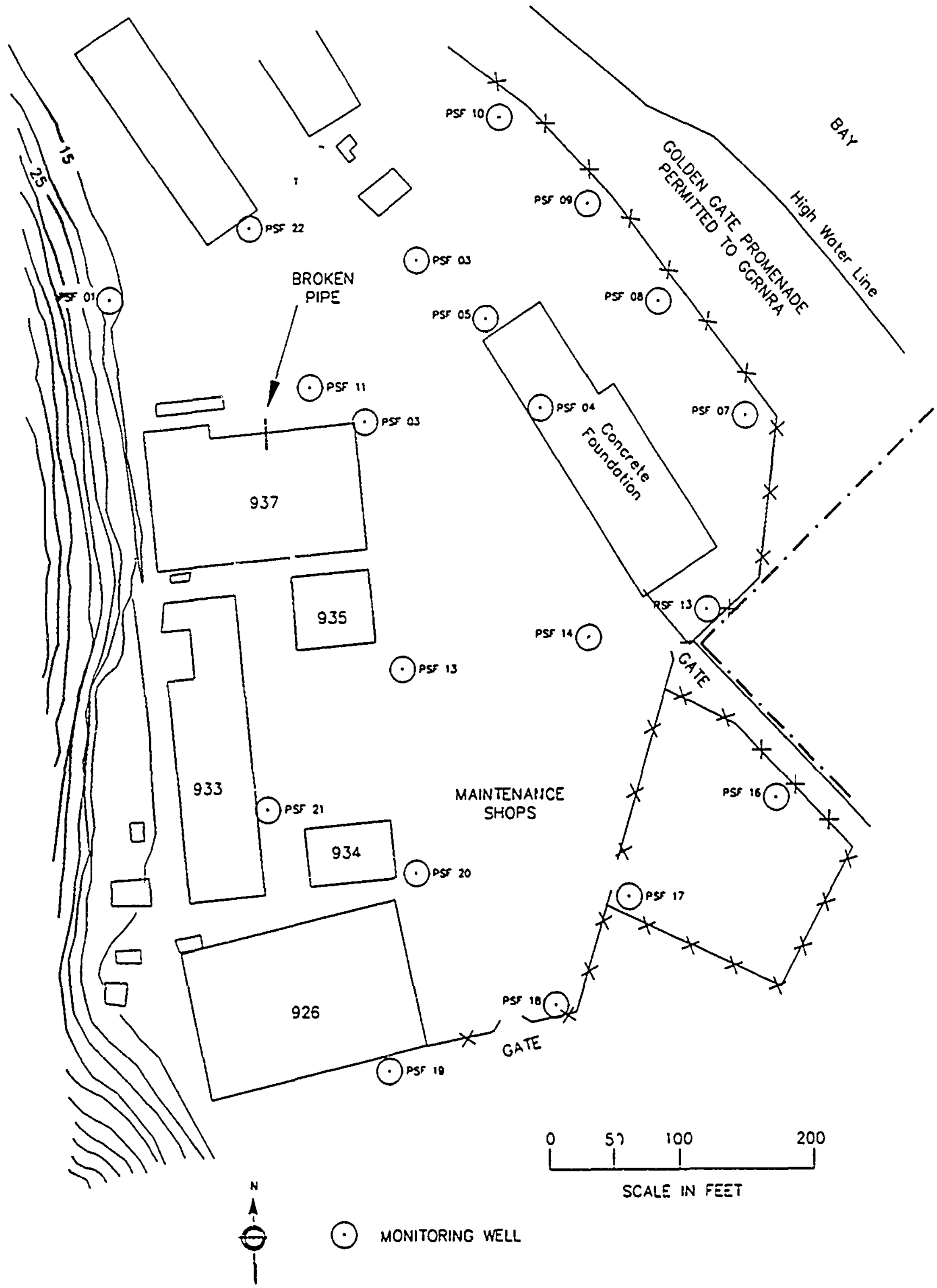

FIGURE A-4 Groundwater Monitoring-Well Locations at Bldg. 937, PSF

It was found that the groundwater at Bldg. 937 contains five organic compounds (benzene, trichloroethylene [TCE], 1,2-dichloroethane, toluene, and xylenes). However, this aquifer is not used for drinking water supplies and the situation does not present a threat to any local drinking water wells. The closest drinking water well is located on PSF approximately 7,200 feet from Bldg. 937. Furthermore, except possibly for a very sensitive species, the concentrations of detected organic compounds do not represent a toxicity threat to salt water aquatic life, based on information provided in Reference: Notices, Water Quality Criteria Documents; availability, 45 Federal Register (FR) 79318, November 28, 1980.[32]

The essential findings of this study were summarized as follows: the groundwater at Bldg. 937 is contaminated with oil and organic compounds; groundwater in the zone of contamination is essentially static; and the contaminated groundwater is not a threat to drinking water wells or salt water life.

The following major recommendations were made: install and operate an oil recovery well near the source of groundwater contamination; and implement a routine groundwater monitoring program to determine any further movement of the plume of contaminated groundwater. (Neither of these recommendations has yet been implemented.)

A.3.3 Sampling and Analysis of Underground Storage Tank Release, Martech, Dec. 13, 1988[9]

On December 6 and 7, 1988, Martech - Environmental Services (Sacramento, Calif.) drilled eight soil borings at Bldg. 231 in support of the project to remove underground storage tanks and contaminated soils (see Fig. A-4). Four 10,000-gallon fuel tanks, which had been used to store leaded and unleaded gasoline at Bldg. 231 developed leaks and were removed in November 1988 (see Ref. 42). Indications of soil contamination from a tank release were verified. Groundwater was encountered at approximately 8 feet deep and three soil borings were converted to monitoring wells.

The soil and sediment conditions adjacent to the excavated tank site were sampled at regular intervals, and the samples were sent to American Environmental Management Corporation, Analytical Services Laboratory (Rancho Cordova, Calif.) for analysis. Fourteen samples were quantitatively analyzed for total petroleum hydrocarbons (TPH) and volatile aromatics.

Three boreholes were converted to monitoring wells which were installed to depths of 15 feet. The monitoring wells were screened from seven feet below the ground surface to the bottom of the borings.

Results indicated that the soils encountered during drilling consist of interbedded sandy-silty clays, clayey silt and sand, and relatively coarse grained poorly sorted sands.

Results of the laboratory analysis indicated that all boreholes excluding three (MTs 1, 4 and 5) contained total hydrocarbons in soil at 100 parts per million (ppm) or greater. Due to a high proportion of unidentified hydrocarbons, the detection limit or

minimum reporting limit (MRL) was greatly increased for sample MT5-2 and MT5-3. The large amount of interference indicated that although the unidentified hydrocarbons were present in the sample, they were unquantifiable. Table A-6 outlines all analytical results. Figure A-5 displays the locations of all sampling points of the study.

A.3.4 Unauthorized Release from Underground Storage Tank Systems, June 22, 1989[42]

Correspondence from the California Regional Water Quality Control Board, San Francisco Bay Region, requested PSF cooperation in the investigation and remediation of pollution caused by an underground tank leak at Bldg. 231.

It was noted that the Regional Control Board is responsible for oversight of such investigations and remediation of soils and groundwater pollution which impacts or threatens waters of the state, and that the Department of the Army is considered responsible for releases at Bldg. 231.

According to information in the Board's files, the following salient facts have been established with respect to these tank failures:

- Four 10,000-gallon fuel tanks were removed in November 1988 from the location,
- The tanks had been used to store leaded and unleaded gasoline,

TABLE A-6 Analytical Results, Bldg. 231, Dec. 1988

Sample Number	Depth (ft)	TPH (ppm)	Benzene (ppb)	Toluene (ppb)	Xylenes (ppb)
MT1#2	4	<10	72	ND[a]	30
MT1#3	8	<10	50	ND	ND
MT2#2	4.5	860	11,000	4,300	76,000
MT2#3	8	1,300	3,000	14,000	200,000
MT3#1	4	1,800	17,000	130,000	290,000
MT3#2	8	1,800	11,000	91,000	270,000
MT4#2	4.5	ND	ND	ND	ND
MT4#3	7.5	ND	14	17	52
MT5#2	3	98	ND	ND	ND
MT5#3	7	ND	ND	ND	ND
MT6#2	3	1,500	426	2,300	83,000
MT6#3	5	2,500	12,000	2,200	59,000
MT7#2	4	1,500	14,000	7,700	130,000
MT8#2	4	100	690	640	5,600

[a]ND signifies not detected.

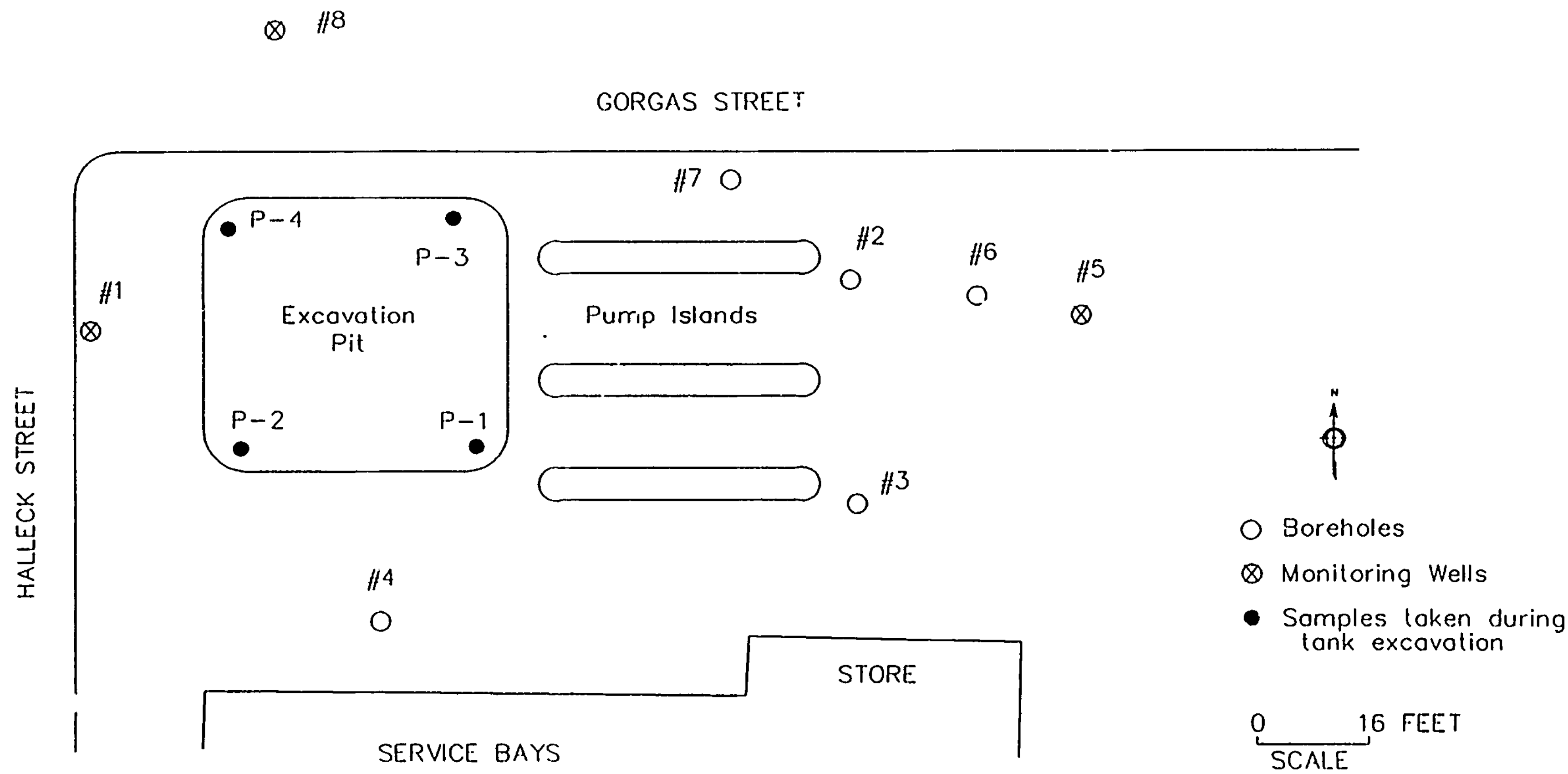

FIGURE A-5 Locations of Borings and Monitoring Wells at Bldg. 231, PSF

- The soils in the tank excavations were found to be "grossly stained" with petroleum products,

- Soil samples collected from the tank excavations at a depth of 8 feet were found to be contaminated with up to 4,000 ppm total petroleum hydrocarbon (TPH),

- Approximately 4,000 gallons of petroleum product was removed from the surface of the groundwater table,

- No sampling was done along the buried pipes connected to the failed tanks,

- Eight soil borings were made in December 1988 (see Ref. 9). Three of the borings were later converted to use as monitoring wells, but no groundwater samples have yet to be collected from these wells,

- Soils recovered from four of the test borings contained over 1,000 ppm total petroleum hydrocarbons.

Based on this information, the Board requested four PSF actions:

1. Submit a technical report which assesses the vertical and horizontal extent of subsurface contamination in the soil and groundwater,

2. Prepare a remedial action plan and a schedule for its implementation,

3. Proceed to clean up subsurface contamination as soon as is practicable to levels consistent with the California Water Code and State Board Resolution #68-16,

4. Submit progress reports to the Board and to the local agency on a quarterly basis.

(No action has yet been taken by PSF in response to this letter.)

A.4 AIR POLLUTION CONSULTATION NO. 44-21-0347-83, AUG. 16-20, 1982[43]

The purpose of this work was to assist PSF in identifying, evaluating, and registering applicable air pollution sources with local regulatory authorities. Because of time limitations, the scope of this consultation was limited to identifying and registering applicable air pollution sources at PSF with the Bay Area Air Quality Management District (BAAQMD), San Francisco. Future air pollution status and evaluation surveys were scheduled for PSF to review each individual source for compliance with both federal, state, and local regulations regarding abatement.

The PFS is located within the San Francisco Bay Area Intrastate Air Quality Control Region (AQCR); the region is designated No. 30 by the USEPA. The PSF lies within that particular part of the AQCR which is presently in attainment of the National Ambient Air Quality Standards (NAAQS) for total suspended particulates, sulfur dioxide, and nitrogen oxides (NO_x). This same area is in nonattainment status of the NAAQS for ozone and carbon monoxide. The significance of this attainment status is reflected in the strict State and local air pollution regulations.

Department of the Army installations are required to comply with all applicable federal, state, local and U.S. Army regulations with the most stringent being applicable. The governing requirements at the time of this consultation were those contained in the BAAQMD regulations as administered by BAAQMD, and reinforced by the Clean Air Act Amendments of 1977 (PL 95-95). Of particular importance, it requires Federal facilities to comply with all applicable State and local procedural and administrative requirements in addition to meeting substantive standards. Compliance with selected procedural and administrative requirements was found to require coordination with the BAAQMD location in San Francisco.

BAAQMD regulations require facilities emitting more than 5,000 pounds (2.5 tons) per year of nitrogen oxides to obtain operating permits of all equipment that is not exempted by this regulation and which emits an air contaminant. The PSF has two major heating plants (Bldgs. 1040 and 1802) which individually exceed the 2.5-tons-per-year standard. The BAAQMD has designated PSF by definition as a "facility" rather than numerous individual facilities within an installation. Because of this, all required operating permits may be obtained under one name, "PSF." Federal facilities must also pay fees for the annual renewal of operating permits.

Nineteen air pollution sources in PSF have been identified as nonexempt, and each one has been registered with the BAAQMD. Air pollution sources identified as nonexempt are listed in Table A-7.

A.5 INSTALLATION-WIDE ASSESSMENT, REPORT 321, OCT. 1983[3]

The purpose of this assessment was to determine the existence of toxic and hazardous materials and related contamination at PSF, emphasizing those substances posing a potential for migration off the installation. The on-site assessment was conducted at PSF and its four subinstallations: East Fort Baker, Parks Reserve Forces Training Area, Rio Vista Reserve Training Activity, and Hamilton Army Airfield. This summary will cover only those portions of the assessment dealing with PSF.

This assessment begins with a summary of the installation organization and mission, history, environmental setting, and leases and agreements. It then highlights the only two legal claims of record against PSF involving toxic/hazardous materials. A summary of these claims follows.

TABLE A-7 Air Pollution Sources in PSF

BAAQMD Source No.	Building	Identification	BAAQMD Emission Point No. (P)[a]	BAAQMD Abatement No.
1	1040	5 - Boilers	P1	NA
2	1802	3 - Boilers	P3	NA
3	1110	Incinerator	P2	NA
4	1065	Incinerator	P4	NA
5	926	Painting Operation	P5a, P5b	NA
6	926	Drying Room	P6	NA
7	285	Painting Operation	P7	NA
8	1244	Graphics	NA	NA
9	1088	Diesel Fuel Storage Tank, 20,000 gallons	NA	NA
10	1349	Fuel Oil No. 2 Storage Tanks, 100,000 gallons	NA	NA
11	637	3 - MOGAS Storage Tanks 20,000 gallons Each	NA	NA
12	637	3 - Diesel Fuel Storage Tanks, 5,000 Gallons Each	NA	NA
13	1264	Diesel Fuel Storage Tank, 10,000 gallons	NA	NA
14	231	7 - MOGAS Tanks - AAFES, 10,000 gallons Each	NA	NA
15	1167	Furniture Finishing Spray Booth	P8	NA
16	926 (area)	Abrasive Blast (Open-bay Type)	NA	NA
17	669	Shredder/Pulper	P9	NA
18	268	Abrasive Blast (Open-bay Type)	NA	NA
19	926 (area)	Spray Painting (Open-bay Type)	NA	NA

[a]P signifies the BAAQMD code for an emission point. P-code emission points considered to be regulated under BAAQMD.

A legal claim was filed against PSF by the City of San Francisco for approximately $120,000 to cover the cost of the repair, cleanup, and rerouting of a broken sewage pipeline in January 1981. Dye studies indicated that the pipeline carried only sewage originating at PSF, but the city cleaned and repaired the pipeline immediately, so no health-related problems were associated with the pipeline break. At the time this section of the assessment was written (June 17, 1983), the Staff Judge Advocate's Office was seeking help from the General Accounting Office to reimburse the city.

A claim was also filed against the U.S. Army by the descendants of Edward Nevin charging that Mr. Nevin died as a result of negligence of the U.S. government in conducting biological warfare vulnerability tests of the City of San Francisco in September 1950. Two biological simulants were used in the six simulated attacks. The court ruled that the government was not negligent in conducting its testing program, that the simulants were not toxic, and that Nevin's death was not caused by the simulants released by the Army.

Installation operations were reviewed. The industrial operations covered included vehicle maintenance shops and wash racks, metalworking, small arms repair, electronic equipment maintenance, furniture repair, painting, woodworking, plumbing, refrigeration/air conditioning/heating repair, electrical repair, laundry, and printing.

A review of laboratory operations for LAMC and LAIR was presented. Within LAMC, the Department of Pathology nonclinical laboratories included veterinary medicine, cytogenetics, bacteriology, chemistry, anatomic pathology, and hematology. Waste chemicals from these operations were temporarily stored at the site of generation or in Bldg. 630 until they were manifested and recycled or disposed of by a certified private contractor in a Class I chemical landfill. Infectious and pathological wastes were collected separately from general refuse and double-bagged. Storage was outside Bldg. 1100 in rigid cardboard within a locked, concrete storage area until hauled away by a private contractor to a Class II-1 sanitary landfill. Human tissue was disposed of by incineration. X-ray and photographic fixatives and excess dental amalgam were turned over to the DPDO for silver recovery as were X-ray foil linings for lead recovery.

Laboratory operations at LAIR included analytical chemistry, animal resources, operating, pathology, radioisotope, and toxicology. At the time this assessment was written, chemicals were acquired as needed and stored in each laboratory, but a building adjacent to Bldg. 1100 was under construction for bulk chemical storage. Waste chemicals and solvents were collected at the site of generation, manifested, and recycled or disposed of by a certified private contractor in a Class I chemical landfill. Spent X-ray and photographic fixative was taken to DPDO for silver recovery. Pathological wastes from animal surgery were incinerated.

Photographic laboratories were operated at PSF in Bldgs. 35, 122, 603, 1242, and 1750. These laboratories either recovered their own silver or sent spent fixative to the main photographic laboratory (Bldg. 603) for recovery. The recovered silver was then sent to the DPDO. Following extraction, the fixative solution was discharged to the sanitary sewer.

This installation-wide assessment report indicates that when Nike Missile Launch Site 89L at PSF was dismantled in 1974, all equipment was reportedly removed and transported to Sierra Army Depot in Herlong, Calif. Reportedly no fuel, catalysts, acids, or other material associated with the installations were disposed of on PSF. The assessment indicates that Site 89L is now paved over and used as a parking lot for recreational vehicles. (This indication conflicts with observations made by ANL investigators during the site visit, however.)

The handling and storage of toxic and hazardous materials at PSF was then treated in detail. Substances covered included pesticides, PCBs, chemicals, radiological materials, and chemical/biological (CB) agents. A summary of the subject matter presented follows.

Use and application of pesticides at PSF was administered by the Entomology Shop within the Land Management Branch of DEH except for a small pesticide management operation within LAIR. Insecticides and rodenticides were stored in Bldg. 293 and herbicides were stored in a shed adjacent to Bldg. 269. The study found that in 1983, Bldg. 293 lacked continuous curbing and it was therefore concluded that the facility was not in compliance with USAEHA criteria. As of 1983, 50 pesticides were listed as being stored in these two buildings. No information was available as to what other storage areas may have received historical use at PSF.

Mixing and formulation of pesticide solutions was performed within Bldg. 269 and water was added to large equipment outside that building. Both areas were concrete paved and had drains exiting to a subsurface holding tank near Bldg. 269. A private contractor emptied the tank and disposed of the solution at a hazardous waste disposal site. The empty pesticide containers were triple-rinsed and crushed or punctured prior to disposal by a private contractor in a sanitary landfill off-post. Pesticides were applied in compliance with USAEHA criteria. A summary of the pesticide use at PSF from April through July, 1981, was presented, as was a summary of a distribution survey conducted in 1975 by USAEHA. Findings included cumulative pesticide concentrations which exceeded the recommended threshold level for soils in the vicinity of the storage area and in an unspecified residential area. As a result of the survey, USAEHA recommended that: (1) pesticide storage and handling procedures at PSF be reviewed, (2) use of pesticides in residential areas be minimized, and (3) migration from the pesticide storage area and the affected residential area be prevented or minimized. A later review by USAEHA indicated that except for a discharge of spilled pesticide and contaminated rinse water into the sanitary sewer, the program was adequately controlled. The discharge was subsequently corrected.

PCBs were found at PSF in both in-service and out-of-service transformers. If the manufacturer's nameplate failed to define PCB content in an out-of-service transformer, the dielectric fluid was sampled and analyzed. When known PCB dielectric fluid was indicated, the concentration was assumed to be greater than 500 ppm. Transformers removed from service were kept in Bldg. 680 until their PCB content was determined. Those with concentrations above 7 ppm were classified as hazardous wastes according to California 1981 regulations and were stored in Bldg. 680 pending proper disposal. Building 680 conformed to USEPA regulations.

Previous to 1981, out-of-service transformers were stored behind Bldg. 283. In 1979 they were sorted according to nameplate, and those known to contain PCBs were stored in Bldg. 680. The others were placed on pallets under Doyle Drive. Three of these 35 were found to contain PCBs, but the soil in the area was tested by both the California Dept. of Health Services and DEH and found to contain PCB concentrations below regulatory limits. The three PCB containing transformers were disposed of by a licensed contractor, but USATHAMA found that PSF had not been complying with California Dept. of Health Services requirement that PCB containing transformers be disposed of

within 60 days. This was because no disposal sites were available. Subsequently, the USEPA licensed PCB incineration facilities, and PSF was able to comply. Inventories of out-of-service and in-service transformers were included in the appendix of the installation-wide assessment. Historical leaks of in-service transformers were discussed, including spills in Bldg. 220 and outside Bldg. 649 and a leak outside of Bldg. 1151. Subsequent to the assessment, all leaks were reported repaired and waste PCBs, debris, and out-of-service transformers disposed of according to federal and state requirements.

No record was found of the manufacture, storage, or use of lethal CB agents or munitions at PSF. Training exercises were conducted using riot control agent CS in Battery Dynamite approximately once a month. Simulant training was also conducted sporadically using the M-58 training kit. Military police also reportedly conducted riot control exercises at Battery Dynamite using talcum powder.

The only Nuclear Regulatory Commission (NRC) license authorizing the use of radiological materials at PSF was held by LAMC and also covered the use of such materials at LAIR. Long-lived radioactive waste was collected by the Radioactive Service Group within LAIR, packed in drums, and stored for subsequent proper disposal. Short-lived solids were held for decay and then disposed of as nonradioactive waste. Liquids were monitored, logged, and discharged into the sanitary sewer system in accordance with established limitations. Health Physics Service or Radioisotope Service Group personnel monitored counting laboratories and monitored and cleaned up spills.

POL handling and storage at PSF involved diesel fuel, motor gas, and petroleum-based solvents. The major storage and distribution area was Bldg. 637. The assessment found that the major transfer station there was not equipped with spill containment facilities, and a spill would drain into a nearby storm sewer leading to San Francisco Bay. Other major POL storage areas were described in detail, and several significant drum storage areas were listed.

The drum storage area near Bldg. 924 was the only above-ground storage area having a capacity of more than 1,000 gallons but without having the facilities for controlling potential spillage as required by Army regulations. Subsequently, waste POL was included in the PSF hazardous waste program, and waste POL was collected frequently so that 1,000 gallons was not accumulated. Oil spills resulting from the use of two underground storage tanks near Bldgs. 937 and 979 were detailed. (See Secs. 2.2.1 and 3.4.3.)

An SPCC/ISCP dated June 21, 1979, was prepared by DEH. This plan covers all the POL storage facilities at PSF required by Army and USEPA regulations with the exception of the waste POL drum storage adjacent to Bldg. 638 and the four 10,000-gallon underground motor gas storage tanks near Bldg. 231 (see Sec. 2.2.3). It was pointed out, however, that the total capacity of these areas did exceed the regulatory guidelines for exemption from such a plan.

Disposal operations for industrial wastes at PSF were discussed. Those wastes generated in significant quantities included waste POL; spent battery electrolyte; asbestos brake lining waste; waste paint thinner; wastewater from vehicle wash racks, the wet curtain spray paint recirculation systems, and the laundry; and spent

photographic developing solution. Contract hauling of these wastes was managed through the DPDO in Alameda, Calif., or the DEH at PSF. Waste collection, storage, and transport was detailed by operation, and the information has been included and referenced throughout this report.

Wastewater treatment at PSF was of two types. Stormwater runoff into storm drains was discharged untreated to the various watercourses. Sanitary wastewater was discharged to the sanitary sewer system which conveyed the combined waste stream to the city of San Francisco sanitary sewer system. The only problem arising from this practice was several overflows of raw sewage into a storm drain leading to Baker Beach in 1971. These overflows were caused by a malfunctioning lift station on PSF. The operational problems were corrected, and reportedly no additional overflows had occurred.

During the on-site assessment, PSF was preparing a comprehensive draft hazardous waste management plan. As a generator of hazardous waste, the PSF submitted a Sec. 3010 notification of hazardous waste activity to USEPA in 1980 in accordance with federal hazardous waste regulations and received an USEPA identification number.

Surface and subsurface water quality was discussed briefly. Potable water for PSF was supplied from three sources: Lobos Creek, groundwater, and the city of San Francisco municipal water supply. Treatment of raw water from Lobos Creek consisted of sedimentation, pre- and post-chlorination, rapid sand filtration, and fluoridation. Groundwater was combined with treated surface water and post-chlorinated. Various water quality surveillance programs and their conclusions were discussed. The program of significance involved the monitoring of THM concentrations, which was begun in April 1980. Analyses performed by USAEHA indicated that for several months out of each year TTHM concentrations in PSF drinking water exceeded the 100 μg/L level established by the USEPA. PSF was continuing to monitor the TTHM levels.

The PSF is located in the Bay Area Air Quality Management District. An Air Pollution Status and Evaluation Survey conducted by USAEHA in 1981 concluded that all sources at PSF were in compliance with applicable regulations. However BAAQMD regulations require that all sources greater than 10 million British thermal units (Btu) per hour have a permit to operate. Two sources at Bldg. 1040 exceeded this capacity, but had not obtained permits at the time of the site visit. These permits were subsequently obtained.

No significant sources of noise were noted at PSF.

No significant impact on the fauna or flora of the area were attributed to PSF operations.

Tentative conclusions reached from this assessment were:

1. Available information did not indicate off-post migration of contaminants via surface or subsurface waters.

2. The waste POL and solvent spill at Bldg. 937 was contained.

3. Several practices for handling material or for waste disposal, although not leading to off-post migration, were not in compliance with designated regulations, guidelines, or recommendations.

Tentative recommendations were:

1. That USATHAMA should not conduct a survey at that time.

2. That PSF should continue to coordinate with state regulatory agencies to ensure proper cleanup of the waste POL and solvent spill.

3. That PSF should properly handle and store POL.

4. That PSF should test underground POL storage tanks for leakage on a regular basis.

5. That PSF should properly store pesticides.

6. That PSF should bring the four vehicle wash racks into compliance with Army regulations.

7. That PSF should continue monitoring for TTHM levels in drinking water for an additional year.

APPENDIX B:

PUBLIC LAW 92-589 — OCTOBER 27, 1972

Public Law 92-589
92nd Congress, H. R. 16444
October 27, 1972

An Act

86 STAT. 1299

To establish the Golden Gate National Recreation Area in the State of California, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

Golden Gate National Recreation Area, Calif.

ESTABLISHMENT

SECTION 1. In order to preserve for public use and enjoyment certain areas of Marin and San Francisco Counties, California, possessing outstanding natural, historic, scenic, and recreational values, and in order to provide for the maintenance of needed recreational open space necessary to urban environment and planning, the Golden Gate National Recreation Area (hereinafter referred to as the "recreation area") is hereby established. In the management of the recreation area, the Secretary of the Interior (hereinafter referred to as the "Secretary") shall utilize the resources in a manner which will provide for recreation and educational opportunities consistent with sound principles of land use planning and management. In carrying out the provisions of this Act, the Secretary shall preserve the recreation area, as far as possible, in its natural setting, and protect it from development and uses which would destroy the scenic beauty and natural character of the area.

COMPOSITION AND BOUNDARIES

SEC. 2. (a) The recreation area shall comprise the lands, waters, and submerged lands generally depicted on the map entitled "Boundary Map, Golden Gate National Recreation Area", numbered NRA-GG-80,003A, sheets 1 through 3, and dated July, 1972.

(b) The map referred to in this section shall be on file and available for public inspection in the Offices of the National Park Service, Department of the Interior, Washington, District of Columbia. After advising the Committees on Interior and Insular Affairs of the United States House of Representatives and the United States Senate (hereinafter referred to as the "committees") in writing, the Secretary may make minor revisions of the boundaries of the recreation area when necessary by publication of a revised drawing or other boundary description in the Federal Register.

Boundary revisions, notification of congressional committees. Publication in Federal Register.

ACQUISITION POLICY

SEC. 3. (a) Within the boundaries of the recreation area, the Secretary may acquire lands, improvements, waters, or interests therein, by donation, purchase, exchange or transfer. Any lands, or interests therein, owned by the State of California or any political subdivision thereof, may be acquired only by donation. When any tract of land is only partly within such boundaries, the Secretary may acquire all or any portion of the land outside of such boundaries in order to minimize the payment of severance costs. Land so acquired outside of the boundaries may be exchanged by the Secretary for non-Federal lands within the boundaries. Any portion of land acquired outside the boundaries and not utilized for exchange shall be reported to the General Services Administration for disposal under the Federal Property and Administrative Services Act of 1949 (63 Stat. 377), as amended: *Provided*, That no disposal shall be for less than fair market value. Except as hereinafter provided, Federal property within

Ante, p. 503. 40 USC 471 note.

the boundaries of the recreation area is hereby transferred without consideration to the administrative jurisdiction of the Secretary for the purposes of this Act, subject to the continuation of such existing uses as may be agreed upon between the Secretary and the head of the agency formerly having jurisdiction over the property. Notwithstanding any other provision of law, the Secretary may develop and administer for the purposes of this Act structures or other improvements and facilities on lands for which he receives a permit of use and occupancy from the Secretary of the Army.

Facilities and improvements.

(b) Fort Cronkhite, Fort Barry, and the westerly one-half of Fort Baker, in Marin County, California, as depicted on the map entitled "Golden Gate Military Properties" numbered NRAGG-20,002 and dated January 1972, which shall be on file and available for public inspection in the offices of the National Park Service, are hereby transferred to the jurisdiction of the Secretary for purposes of this Act, subject to continued use and occupancy by the Secretary of the Army of those lands needed for existing air defense missions, reserve activities and family housing, until he determines that such requirements no longer exist. The Coast Guard Radio Receiver Station, shall remain under the jurisdiction of the Secretary of the Department in which the Coast Guard is operating. When this station is determined to be excess to the needs of the Coast Guard, it shall be transferred to the jurisdiction of the Secretary for purposes of this Act.

Forts Cronkhite, Barry, and Baker, transfer of jurisdiction.

(c) The easterly one-half of Fort Baker in Marin County, California, shall remain under the jurisdiction of the Department of the Army. When this property is determined by the Department of Defense to be excess to its needs, it shall be transferred to the jurisdiction of the Secretary for purposes of this Act. The Secretary of the Army shall grant to the Secretary reasonable public access through such property to Horseshoe Bay, together with the right to construct and maintain such public service facilities as are necessary for the purposes of this Act. The precise facilities and location thereof shall be determined between the Secretary and the Secretary of the Army.

Horseshoe Bay, access via Fort Baker.

(d) Upon enactment, the Secretary of the Army shall grant to the Secretary the irrevocable use and occupancy of one hundred acres of the Baker Beach area of the Presidio of San Francisco, as depicted on the map referred to in subsection (b).

Baker Beach, right of occupancy.

(e) The Secretary of the Army shall grant to the Secretary within a reasonable time, the irrevocable use and occupancy of forty-five acres of the Crissy Army Airfield of the Presidio, as depicted on the map referred to in subsection (b).

Crissy Army Airfield, right of occupancy.

(f) When all or any substantial portion of the remainder of the Presidio is determined by the Department of Defense to be excess to its needs, such lands shall be transferred to the jurisdiction of the Secretary for purposes of this Act. The Secretary shall grant a permit for continued use and occupancy for that portion of said Fort Point Coast Guard Station necessary for activities of the Coast Guard.

Fort Point Coast Guard Station, continued-use permit.

(g) Point Bonita, Point Diablo, and Lime Point shall remain under the jurisdiction of the Secretary of the Department in which the Coast Guard is operating. When this property is determined to be excess to the needs of the Coast Guard, it shall be transferred to the jurisdiction of the Secretary for purposes of this Act. The Coast Guard may continue to maintain and operate existing navigational aids: *Provided*, That access to such navigational aids and the installation of necessary new navigational aids within the recreation area shall be undertaken in accordance with plans which are mutually acceptable to the Secretary and the Secretary of the Department in which the Coast Guard is operating and which are consistent with both the purposes of this Act and the purpose of existing

Point Bonita, Point Diablo, and Lime Point, transfer of jurisdiction. Navigation aids, access.

statutes dealing with establishment, maintenance, and operation of navigational aids.

(h) That portion of Fort Miley comprising approximately one and seven-tenths acres of land presently used and required by the Secretary of the Navy for its inshore, underseas warfare installations shall remain under the administrative jurisdiction of the Department of the Navy until such time as all or any portion thereof is determined by the Department of Defense to be excess to its needs, at which time such excess portion shall be transferred to the administrative jurisdiction of the Secretary for purposes of this Act. Fort Miley, transfer of jurisdiction.

(i) New construction and development within the recreation area on property remaining under the administrative jurisdiction of the Department of the Army and not subject to the provisions of subsection (d) or (e) hereof shall be limited to that which is required to accommodate facilities being relocated from property being transferred under this Act to the administrative jurisdiction of the Secretary or which is directly related to the essential missions of the Sixth United States Army: *Provided, however*, That any construction on presently undeveloped open space may be undertaken only after prior consultation with the Secretary. The foregoing limitation on construction and development shall not apply to expansion of those facilities known as Letterman General Hospital or the Western Medical Institute of Research. New construction, limitation. Exceptions.

(j) The owner of improved property on the date of its acquisition by the Secretary under this Act may, as a condition of such acquisition, retain for himself and his heirs and assigns a right of use and occupancy of the improved property for noncommercial residential purposes for a definite term of not more than twenty-five years, or, in lieu thereof, for a term ending at the death of the owner or the death of his spouse, whichever is later. The owner shall elect the term to be reserved. Unless the property is wholly or partially donated to the United States, the Secretary shall pay to the owner the fair market value of the property on the date of acquisition minus the fair market value on that date of the right retained by the owner. A right retained pursuant to this section shall be subject to termination by the Secretary upon his determination that it is being exercised in a manner inconsistent with the purpose of this Act, and it shall terminate by operation of law upon the Secretary's notifying the holder of the right of such determination and tendering to him an amount equal to the fair market value of that portion of the right which remains unexpired. Property owners, retention rights.

(k) The term "improved property", as used in subsection (j), means a detached, noncommercial residential dwelling, the construction of which was begun before June 1, 1971, together with so much of the land on which the dwelling is situated, the said land being in the same ownership as the dwelling, as the Secretary shall designate to be reasonably necessary for the enjoyment of the dwelling for the sole purpose of noncommercial residential use, together with any structures accessory to the dwelling which are situated on the land so designated. "Improved property."

(l) Whenever an owner of property elects to retain a right of use and occupancy as provided for in the Act, such owner shall be deemed to have waived any benefits or rights accruing under sections 203, 204, 205, and 206 of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (84 Stat. 1894), and for the purposes of those sections such owner shall not be considered a displaced person as defined in section 101(6) of that Act. 42 USC 4623-4626. 42 USC 4601.

(m) Notwithstanding any other provision of law, the Secretary shall have the same authority with respect to contracts for the acquisition of land and interests in land for the purposes of this Act as was Contract authority.

given the Secretary of the Treasury for other land acquisitions by section 34 of the Act of May 30, 1908, relating to purchase of sites for public buildings (35 Stat. 545), and the Secretary and the owner of land to be acquired under this Act may agree that the purchase price will be paid in periodic installments over a period that does not exceed ten years, with interest on the unpaid balance thereof at a rate which is not in excess of the current average market yield on outstanding marketable obligations of the United States with remaining periods to maturity comparable to the average maturities on the installments. Judgments against the United States for amounts in excess of the deposit in court made in condemnation actions shall be subject to the provisions of the Act of July 27, 1956 (70 Stat. 624) and sections 2414 and 2517 of title 28, United States Code.

40 USC 261. Installment payments; interest rate.

70 Stat. 694; 84 Stat. 782. 31 USC 724a. 75 Stat. 415; 62 Stat. 979.

ADMINISTRATION

SEC. 4. (a) The Secretary shall administer the lands, waters and interests therein acquired for the recreation area in accordance with the provisions of the Act of August 25, 1916 (39 Stat. 535; 16 U.S.C. 1, 2–4), as amended and supplemented, and the Secretary may utilize such statutory authority available to him for the conservation and management of wildlife and natural resources as he deems appropriate to carry out the purposes of this Act. Notwithstanding their inclusion within the boundaries of the recreation area, the Muir Woods National Monument and Fort Point National Historic Site shall continue to be administered as distinct and identifiable units of the national park system in accordance with the laws applicable to such monument and historic site.

Police and fire protection, cooperative agreements.

(b) The Secretary may enter into cooperative agreements with any Federal agency, the State of California, or any political subdivision thereof, for the rendering, on a reimbursable basis, of rescue, firefighting, and law enforcement and fire eventive assistance.

Water resource developments.

(c) The authority of the Army to undertake or contribute to water resource developments, including shore erosion control, beach protection, and navigation improvements on land and/or waters within the recreation area shall be exercised in accordance with plans which are mutually acceptable to the Secretary and the Secretary of the Army and which are consistent with both the purpose of this Act and the purpose of existing statutes dealing with water and related resource developmen

Transportation system, study.

(d) The Secretary, in cooperation with the State of California and affected political subdivisions thereof, local and regional transit agencies, and the Secretaries of Transportation and of the Army, shall make a study for a coordinated public and private transportation system to and within the recreation area and other units of the national park system in Marin and San Francisco Counties.

ADVISORY COMMISSION

Establishment; membership.

SEC. 5. (a) There is hereby established the Golden Gate National Recreation Area Advisory Commission (hereinafter referred to as the "Commission").

(b) The Commission shall be composed of fifteen members appointed by the Secretary for terms of three years each.

(c) Any vacancy in the Commission shall be filled in the same manner in which the original appointment was made.

(d) Members of the Commission shall serve without compensation, as such, but the Secretary may pay, upon vouchers signed by the Chairman, the expenses reasonably incurred by the Commission and its members in carrying out th ir responsibilities under this Act.

(e) The Secretary, or his designee, shall from time to time, but at least annually, meet and consult with the Commission on general policies and specific matters related to planning, administration and development affecting the recreation area and other units of the national park system in Marin and San Francisco Counties.

(f) The Commission shall act and advise by affirmative vote of a majority of the members thereof.

(g) The Commission shall cease to exist ten years after the enactment of this Act. Termination date.

APPROPRIATION LIMITATION

SEC. 6. There are hereby authorized to be appropriated such sums as may be necessary to carry out the provisions of this Act, but not more than $61,610,000 shall be appropriated for the acquisition of lands and interests in lands. There are authorized to be appropriated not more than $58,000,000 (May 1971 prices) for the development of the recreation area, plus or minus such amounts, if any, as may be justified by reason of ordinary fluctuations in construction costs as indicated by engineering cost indices applicable to the type of construction involved herein.

Approved October 27, 1972.

LEGISLATIVE HISTORY:

HOUSE REPORT No. 92-1391 (Comm. on Interior and Insular Affairs).
SENATE REPORT No. 92-1271 accompanying S. 3174 (Comm. on Interior and Insular Affairs).
CONGRESSIONAL RECORD, Vol. 118 (1972):
Oct. 11, considered and passed House.
Oct. 12, considered and passed Senate, in lieu of S. 3174.
WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Vol. 8, No. 44:
Oct. 28, Presidential statement.

APPENDIX C:

PERMIT TO OTHER FEDERAL GOVERNMENT DEPARTMENT OR AGENCY NO. DACA05-4-72-531

DEPARTMENT OF THE ARMY
PERMIT TO OTHER FEDERAL GOVERNMENT DEPARTMENT OR AGENCY
TO USE PROPERTY ON
PRESIDIO OF SAN FRANCISCO, CALIFORNIA

No. DACA05-4-76-531

THE DEPARTMENT OF THE INTERIOR, NATIONAL PARK SERVICE, hereinafter referred to as "the Permittee," is hereby granted a permit by the Secretary of the Army in accordance with the provisions of Section 3 of Public Law 92-589, approved 27 October 1972 (86 Stat. 1299; 16 U.S.C. 460bb-2[illegible]), for an indefinite term effective as of the date of execution hereof, to develop, use, and maintain a public recreation area as part of the Golden Gate National Recreation Area on approximately 45 acres of fast land and approximately 346 acres of submerged land comprising a portion of the northern shoreline and western and northern tideland areas of the Presidio of San Francisco, California, which fast land is described in Exhibit "A" and shown on Exhibit "B" (Parcels A and B) and which fast and submerged lands (Parcels A, B and C) are located as shown substantially in red on Exhibit "C", which exhibits are attached hereto and made a part hereof.

THIS PERMIT is granted subject to the following conditions:

1. That the use and occupation of the permitted premises is granted by means of this permit as provided by Public Law 92-589 until such time as the whole of the Presidio of San Francisco is transferred to the permittee as a result of the installation becoming excess to military requirements; that the permittee's use and occupation of the said premises shall be without cost or expense to the Department of the Army and shall be without interference with Department of the Army use of adjacent areas and improvements and those facilities and improvements on the permitted premises which are reserved for Department of the Army use as herein provided; specifically, the permittee's use and occupation of the permitted premises shall not interfere with helicopter operations on the portion of Crissy Field retained for Army use.

2. That it is understood that utility and communication systems on the Presidio of San Francisco are taxed to their design capacities and that therefore any upgrading and extending of the existing systems for the permittee's use shall be accomplished and maintained at the permittee's expense; that all modifications and alterations of existing facilities or construction of roads, shall be coordinated with the Commander, Headquarters, Presidio of San Francisco (hereinafter referred to as the "said Commander"), prior to such modification, alteration, and construction; that the permittee at its expense may connect utility and wire communication lines to appropriate Department of the Army systems with such services as may be available being provided to the permittee on a reimbursable basis; that all requests for service and utilities shall be in writing and inter-agency support as may be provided locally shall be covered by a Memorandum of Understanding negotiated between the said Commander and the Permittee.

3. That the permittee shall, at its own expense and without cost or expense to the Department of the Army, maintain and keep in good repair and condition the premises herein permitted except that the facilities retained for Army use shall be maintained by the Department of the Army.

4. That it is understood that The Pacific Telephone and Telegraph Company and the US Coast Guard have underground communication cable easements within the permitted premises; that since there is a continued requirement for Department of the Army use of certain access roads, utility and communication systems, and facilities within the permitted premises (including certain buildings), the Department of the Army reserves the use of such and reserves rights-of-way for existing and/or replacement access roads, utility and communication systems, and facilities, substantially as shown on Exhibits "D" and "E", and as listed on Exhibit "F", all of which exhibits are attached hereto and made a part hereof.

5. That it is understood that the permitted premises are to be developed for public recreation use and that facilities within the permitted premises retained for Army use will be vacated as soon as replacement facilities are available; that improvements, as vacated, other than pavement and underground facilities, will be removed in accordance with proper Army authority and procedures, subject to the availability of funds for such and the capability of the said Commander to provide for such removal.

6. That the permittee's use of the permitted premises includes permission to place directional signs on property controlled by the Department of the Army outside of the permitted premises; provided, however, that the positioning and locating of the signs shall be subject to the approval of the said Commander.

7. That the permittee shall be responsible for compliance with the requirements of Executive Order 11593, "Protection and Enhancement of the Cultural Environment," and Public Law 91-190, "National Environmental Policy Act of 1969," with respect to its construction and other activities on the permitted premises.

IN WITNESS WHEREOF, I have hereunto set my hand by direction of the Assistant Secretary of the Army this 11th day of December 1975.

Gordon M. Hobbs

Gordon M. Hobbs
Assistant for Real Property
OASA (I&L)

Approved:

NATIONAL PARK SERVICE

BY: ______________ DATE: ______________

TITLE: General Manager
Bay Area National Parks

'ac. No.	Designation	Year Built	Unit of Measure	Cost to Government	Notes*
ι.	BUILDINGS AND STRUCTURES				
?52	Commissary	1919	58,910 SF	$350,944.76	Army requests retention of facility for present use
?53	Mess Hall	1940	2,064 SF	6,579.34	Army has vacated
2[illegible]	Sewing Center	1940	1,315 SF	6,760.00	Army has vacated
257	Mess Hall	1941	5,000 SF	43,179.55	Army has vacated
262	Diesel Station without building	1958	1,000 GA	400.00	Army requests retention for present use
263	Aircraft Maintenance Hangar	1943	2,788 SF	9,640.52	Army has vacated
264	Road Oil Tank	1958	1,000 GA	200.00	Army requests retention for present use
267	Wash Platform	1951	64 SF	7,366.11	Army requests retention for present use
268	Vehicle Shed	1951	114,783 SF	45,000.00	Army requests retention for present use
26[illegible]	Entomology Building	1971	824 SF	24,151.86	Army requests retention for present use
271	Applied Instruction Bldg	1941	4,820 SF	15,754.25	Army has vacated
272	Clinical Specialist School	1941	4,770 SF	16,015.24	Army has vacated
273	Drug & Alcohol Rehabilitation	1941	4,820 SF	14,000.00	Army has vacated
275	Crissy Snack Bar	1941	3,394 SF	41,624.80	Army has vacated

[illegible] "G"
Permit No. DACA05-4-76-531

Crissy Field Hobel
PSF-213/Gen
Lease

AMENDMENT NO. 1
TO
DEPARTMENT OF THE ARMY
PERMIT NO. DACA05-4-76-531
PRESIDIO OF SAN FRANCISCO, CALIFORNIA

Department of the Army Permit No. DACA05-4-76-531, granting the use of approximately 45 acres of fastland in the Crissy Field area and approximately 346 acres of submerged land along the northern and western shoreline of the Presidio of San Francisco, California, to the Department of the Interior, National Park Service, for development of the Golden Gate National Recreation Area, is hereby amended, effective as of the date of execution, in the following particulars:

1. Buildings Nos. T-256, T-275, and T-277, listed as buildings to be retained by Army on Exhibit "D" of said permit, are hereby deleted.

2. All reference to the words "Exhibit F" are deleted from the permit and the words "Exhibit G" are substituted therefor. Exhibit "F" is hereby withdrawn from the permit and Exhibit "G", attached hereto and made a part hereof, is hereby substituted therefor.

Said permit is amended in the above particulars only and all other conditions thereof shall remain binding and in full force and effect. The above amendment shall henceforth be considered a part of the said permit as if fully and completely written therein.

IN WITNESS WHEREOF, I have hereunto set my hand by authority of the Secretary of the Army this 1st day of March 1977.

Morgan Wheeler
MORGAN WHEELER
Chief, Real Estate Division
US Army Engineer District, Sacramento

Approved:

DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
BY: Jerry L. Schober
TITLE: Supt. 2/22/77

IMPROVEMENTS WITHIN CRISSY FIELD AREA, PRESIDIO OF SAN FRANCISCO
(Cont.)

Fac. No.	Designation	Year Built	Unit of Measure	Cost to Government	Notes*
276	Drug & Alcohol Rehabilitation	1941	4,820 SF	$ 18,155.46	Army will vacate 15 April 1977
277	Youth Center	1941	1,781 SF	19,661.11	Army has vacated
[illegible]	Engineer Administration Bldg	1941	5,628 SF	16,998.00	Army requests retention for present use
281	Hot Water Tank Building	1957	24 SF	192.00	Army requests retention for present use
283	Engineer Administration	1914	32,064 SF	79,565.27	Army requests retention for present use
285	Engineer Paint Shop	1944	5,914 SF	18,261.00	Army requests retention for present use
286	Engineer Lumber & Pipe Storage Shed	1950	2,041 SF	6,496.00	Army requests retention for present use
287	Insect and Rodent Control	1946	459 SF	650.00	Army requests retention for present use
288	Engineer Carpenter Shop	1943	5,253 SF	13,785.00	Army requests retention for present use
289	Transformer Vault	1952	280 SF	11,280.00	Army requests retention for present use
[illegible]	Engineer Roads & Grounds Shop	1943	3,500 SF	14,000.00	Army requests retention for present use
292	Flammable Storage	1951	144 SF	494.00	Army requests retention for present use
293	Flammable Storage	1951	144 SF	494.00	Army requests retention for present use
294	Flammable Storage	1951	144 SF	494.00	Army requests retention for present use
295	Flammable Storage	1951	144 SF	494.00	Army requests retention for present use
296	Flammable Storage	1951	144 SF	494.00	Army requests retention for present use
297	Flammable Storage	1951	144 SF	494.00	Army requests retention for present use

IMPROVEMENTS WITHIN CRISSY FIELD AREA, PRESIDIO OF SAN FRANCISCO
(Cont.)

Fac. No.	Designation	Year Built	Unit of Measure	Cost to Government	Notes*
298	Flammable Storage	1951	144 SF	$ 494.00	Army requests retention for present use
	SUB-TOTALS: 32 Items		278,562 SF	$784,118.27	
B.	UTILITIES				
	Water Lines	NA	3,699 LF	3[illegible],997.62	Army requests retention of 2,000 LF for present use
	Sewer Lines	NA	1,040 LF	7,664.80	Army requests retention of 650 LF for present use
	Gas Lines	NA	1,803 LF	18,715.14	Army requests retention of 1,560 LF for present use
	Electric Power Lines	NA	1,425 LF	11,856.00	Army requests retention of 1,200 LF for present use
	Exterior Lights	NA	1,560 LF	3,588.00	Army requests retention of 1,200 LF for present use
	Runway Lights	1953	2,608 LF	35,013.00	Army has vacated
	Storm Drain Lines	NA	5,835 LF	79,180.95	Army requests retention of 5,835 LF for present use
	Fencing	NA	5,427 LF	18,071.91	Army requests retention of 3,082 LF for present use
	SUB-TOTALS: 8 Items		23,397 LF	$205,087.42	

IMPROVEMENTS WITHIN CRISSY FIELD AREA, PRESIDIO OF SAN FRANCISCO
(Cont.)

Fac. No.	Designation	Year Built	Unit of Measure	Cost to Government	Notes*
C.	COMMUNICATION AND ALARM SYSTEMS				
	Telephone Lines	NA	2,345 LF	11,068.30	Army requests retention of 2,080 LF for present use
	Fire Alarm	NA	13 BX	5,078.32	Army requests retention of 13 boxes
	SUB-TOTALS: 2 Items			$16,146.62	
D.	SURFACE IMPROVEMENTS				
	Roads, Paved	NA	13,844 SY	25,196.08	Army requests retention of 10,718 SY for present use
	Roads, Untreated	NA	4,393 SY	3,514.40	Army has vacated
	Vehicle Parking	NA	22,107 SY	88,649.07	Army requests retention of 10,718 SY for present use
	Sidewalks	NA	650 SY	1,118.00	Army has vacated
	SUB-TOTALS: 4 Items		40,994 SY	$118,477.55	
	GRANT TOTAL COST OF ABOVE:			$1,127,629.86	

SF = Square Feet
GA = Gallons
LF = Linear Feet
SY = Square Yards
NA = Not applicable
BX = Boxes

NOTES* - Items for which Army requests retention, identified in the notes will be vacated as soon as replacement facilities are available. Facilities retained for Army use will continue to be maintained by the Army. Improvements, as vacated, other than pavement and underground facilities, will be removed in accordance with proper Army authority and within the capability of the Installation Commander.

APPENDIX D:

PERMIT TO OTHER FEDERAL GOVERNMENT DEPARTMENT OR AGENCY NO. DACA05-4-74-542

DEPARTMENT OF THE ARMY
PERMIT TO OTHER FEDERAL GOVERNMENT DEPARTMENT OR AGENCY
TO USE PROPERTY ON
PRESIDIO OF SAN FRANCISCO, CALIFORNIA

No. DACA05-4-74-542

THE DEPARTMENT OF THE INTERIOR, NATIONAL PARK SERVICE, hereinafter referred to as "the Permittee," is hereby granted a permit by the Secretary of the Army in accordance with the provisions of Public Law 92-589 for an indefinite term effective as of the date of execution hereof, to develop, use, and maintain a public recreation area as part of the Golden Gate National Recreation Area on approximately 103 acres of land comprising the western shoreline area of the Presidio of San Francisco, California, which land is located as shown substantially in red on Exhibit "A" attached hereto and made a part hereof.

THIS PERMIT is granted subject to the following conditions:

1. That the use and occupation of the permitted premises is granted by means of this permit as provided by Public Law 92-589 until such time as the whole of the Presidio of San Francisco is transferred to the permittee as a result of the installation becoming excess to military requirements; that the use and occupation of the said premises shall be without cost or expense to the Department of the Army and shall be without interference with Department of the Army use of adjacent areas and improvements and those facilities and improvements on the permitted premises which are reserved for Department of the Army use as herein provided.

2. That it is understood that utility and communication systems on the Presidio of San Francisco are taxed to their design capacities and that therefore any upgrading and extending of the existing systems for the permittee's use shall be accomplished at the permittee's expense; that all modifications and alterations of existing facilities or construction of roads, shall be coordinated with the Commander, Headquarters, Presidio of San Francisco (hereinafter referred to as the "said Commander"), prior to such modification, alteration, and construction; that the permittee at its expense may connect utility and wire communication lines to appropriate Department of the Army systems with such services as may be available being provided to the permittee on a reimbursable basis; that all requests for service and utilities shall be in writing and inter-agency support as may be provided locally shall be covered by a Memorandum of Understanding negotiated between the said Commander and the Permittee.

3. That the permittee shall, at its own expense and without cost or expense to the Department of the Army, maintain and keep in good repair and condition the premises herein permitted.

4. That since the primary source of potable water for the Presidio of San Francisco is a water plant located adjacent to the permitted premises and there is a continued requirement for Department of the Army use of certain access roads and facilities within the permitted premises, the Department of the Army reserves rights-of-way for existing and/or replacement access roads to such facilities used by the Department of the Army, to include five (5)-foot maintenance rights-of-way on each side of such access roads and the Department of the Army reserves rights-of-way twenty (20) feet in width for existing active utility and communication lines on the said premises at the locations shown in red on Exhibit "B" attached hereto and made a part hereof.

5. That on a temporary basis and until such time as substitute facilities are available, the Department of the Army reserves the use of Battery Chamberlin, Structure No. 1661, including ancillary facilities, and New Mine Casemate, Structure No. 1601, for storage and for training of personnel in the use of equipment for protection against toxic materials; that similarly, the use of the south bay of Building No. 1647 is temporarily reserved for use by the California Army National Guard, who now occupies the space through Department of the Army sponsorship in support of the Air Defense mission.

6. That the structures, facilities, and improvements on the permitted premises that are reserved for Department of the Army use are more particularly identified in the comments made for each improvement located on the said premises as set forth in Exhibit "C" attached hereto and made a part hereof; that conditions of use of the reserved structures, facilities, and improvements and further information regarding such use shall be as specified in the Memorandum of Understanding referred to in Condition No. 2 of this permit.

7. That the permittee's use of the permitted premises includes permission to place directional signs on property controlled by the Department of the Army outside of the permitted premises; provided, however, that the positioning and locating of the signs shall be subject to the approval of the said Commander.

8. That the permittee shall be responsible for compliance with the requirements of Executive Order 11593, "Protection and Enhancement of the Cultural Environment," and Public Law 91-190, "National Environmental Policy Act of 1969," with respect to its construction and other activities on the permitted premises.

IN WITNESS WHEREOF I have hereunto set my hand by direction of the Assistant Secretary of the Army this 23rd day of April, 1974.

Gordon M. Hobbs
Assistant for Real Property
OASA(I&L)

Approved:

NATIONAL PARK SERVICE

BY: William J. Whalen

DATE: 12/31/73

Title: William J. Whalen
Superintendent
Golden Gate National
Recreation Area

Hobel Baker Beach

AMENDMENT NO. 1
TO
DEPARTMENT OF THE ARMY
PERMIT NO. DACA05-4-74-542
PRESIDIO OF SAN FRANCISCO, CALIFORNIA

Department of the Army Permit No. DACA05-4-74-542, granting the use of approximately 103 acres of land in the Baker Beach area of the Presidio of San Francisco, California, to the Department of the Interior, National Park Service, for development of the Golden Gate National Recreation Area, is hereby amended, effective as of the date of execution hereof, in the following particulars:

1. Condition No. 5 is hereby deleted from the permit.

2. All reference to the words "Exhibit C" are deleted from the permit and the words "Exhibit D" are substituted therefor. Exhibit "C" is hereby withdrawn from the permit and Exhibit "D", attached hereto and made a part hereof, is hereby substituted therefor.

Said permit is amended in the above particulars only and all other conditions thereof shall remain binding and in full force and effect. The above amendment shall henceforth be considered a part of the said permit as if fully and completely written therein.

IN WITNESS WHEREOF, I have hereunto set my hand by authority of the Secretary of the Army this 1st day of March 1977.

MORGAN WHEELER
Chief, Real Estate Division
US Army Engineer District, Sacramento

Approved:

DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
BY: Jerry L. Schober
TITLE: Supt. 2/22/77

HH/ss

EXHIBIT "L"
Permit DACA05-1-74-542

IMPROVEMENTS WITHIN BAKER BEACH AREA, PRESIDIO OF SAN FRANCISCO

Improvements at Baker Beach in Irrevocable Permit to Department of the Interior

Fac. No.	Designation	Year Built	Unit of Measure	Cost to Government	Terms of Use
1.	BUILDINGS/STRUCTURES		-		
1600	Old Mine Casemate	1912	1,144 SF	$ 19,851	Tenant will maintain at no cost to Army
16[illegible]	New Mine Casemate	1943	32,080 SF	139,686	Tenant will maintain at no cost to Army
1620	Distribution Transformer	1944	64 SF	800	Army requests retention of present use
1621	Battery Chamberlin (Gas Chamber)	1904	5,583 SF	100,803	Tenant will maintain at no cost to Army
1622	Flam Storage	1904	300 SF	1,000	Tenant will maintain at no cost to Army
1625	Flam Storage	1941	125 SF	500	Tenant will maintain at no cost to Army
1630	Battery Crosby	1900	2,755 SF	40,000	Tenant will maintain at no cost to Army
640	Storage	1876	188 SF	1,000	Tenant will maintain at no cost to Army
64[illegible]	Storage	1876	186 SF	1,000	Tenant will maintain at no cost to Army
644	Vacant Radio Transmitter Bldg	1911	739 SF	750	Tenant will maintain at no cost to Army
646	Underground Storage Facility	1876	170 SF	1,000	Tenant will maintain at no cost to Army
647	Battery Godfrey	1895	6,038 SF	80,000	Tenant will maintain at no cost to Army
651	Battery Boutelle (Underground Storage)	1898	1,374 SF	40,000	Tenant will maintain at no cost to Army

IMPROVEMENTS WITHIN BAKER BEACH AREA, PRESIDIO OF SAN FRANCISCO
(Cont.)

Fac. No.	Designation	Year Built	Unit of Measure	Cost to Government	Terms of Use
1658	Storage	1898	460 SF	$ 500	Tenant will maintain at no cost to Army
1660	Battery Marcus Miller	1896	5,027 SF	100,000	Tenant will maintain at no cost to Army
2.	ROADS				
	Paved	1943	2,489 SY	4,530	Maintenance is responsibility of tenant
	Untreated	1943	6,533 SY	5,880	Maintenance of road is responsibility of tenant
3.	PARKING	Undet.	9,056 SY	37,311	Tenant will assume responsibility
4.	FENCING	Undet.	4,000 LF	13,840	Tenant will assume responsibility
5.	UT. TY DISTRIBUTION SYSTEMS				
	Electrical System	Undet.	2,000 LF	14,520	Army requests retention of 600 LF for continued use. Tenant will assume responsibility for remainder.
	Water System	Undet.	2,400 LF	18,744	Army requests retention of 600 LF for continued use. (See Exhibit B) Tenant will assume responsibility for remainder.
	Sanitary Sewer	Undet.	2,400 LF	14,712	Army requests retention of 800 LF. Tenant will assume responsibility for remainder.
6.	COMMUNICATION DISTRIBUTION SYSTEM				
	Telephone (Underground)	Undet.	8,000 LF	37,440	Army requests retention of 7,200 LF. Tenant will assume responsibility for remainder.

NOTE: 1. Army will continue to assume maintenance responsibility for all facilities occupied or used by Army.
2. Army will reserve 20-foot wide maintenance easement for servicing Army utility lines.

APPENDIX E:

MEMORANDUM OF UNDERSTANDING BETWEEN THE U.S. ARMY AND THE CALIFORNIA STATE CLEARINGHOUSE

MEMORANDUM OF UNDERSTANDING

between the

UNITED STATES ARMY

PRESIDIO OF SAN FRANCISCO

CALIFORNIA, 94129

and the

CALIFORNIA STATE CLEARINGHOUSE

OFFICE OF THE GOVERNOR

SACRAMENTO, CALIFORNIA

implementing

OMB CIRCULAR A-95

This MEMORANDUM OF UNDERSTANDING, between the UNITED STATES ARMY, THE PRESIDIO OF SAN FRANCISCO, CALIFORNIA, hereinafter called the Army, represented by the Facilities Engineer, and the CALIFORNIA STATE CLEARINGHOUSE, OFFICE OF PLANNING AND RESEARCH, SACRAMENTO, CALIFORNIA, hereinafter called the State Clearinghouse, represented by the Director of Management Systems, acting pursuant to Section 102 of the National Environmental Policy Act of 1969 and Office of Management and Budget Circular A-95 (Revised 11/13/73).

WITNESSETH,

WHEREAS, the Army and the State Clearinghouse are mutually interested in the exchange of information on proposed Federal, State and Local Government activities and activities of individual developers which will have a significant effect on the plans and programs of the Army and Local and State Governments; and

WHEREAS, the Army and the State Clearinghouse are mutually interested in assuring that proposed activities identified herein are compatible with State, Regional, Local and Post plans and programs;

NOW THEREFORE,

THE ARMY AGREES TO:

1. Report to the State Clearinghouse proposed plans for future development, including the following:

a. Installation Master Plan (a portion of which consists of the General Site Map, the General Site Plan, the Analytical Report and the Tabulation of Existing and Required Facilities) showing existing and proposed facilities and operations which affect areas of mutual Army and public concern and extends outside the Installation boundary through interconnecting services such as roads and utilities and/or which impact area environmental factors of air, water, sociological aesthetics, etc., and releasable data on real estate transactions.

b. Installation projects and effect determined concerning historic preservation.

c. All Draft Environmental Impact Statements released by Department of Army for circulation and Final Environmental Impact Statements.

2. Report according to the following procedures:

a. The State Clearinghouse will be provided input on Army projects through the filing of form CA-189 (for informational purposes only) and the submittal of a modified DA Form 1391.

b. Under Section 106 of the National Historic Preservation Act of 1966, a determination of effect is made for every proposed major project. These determinations will be forwarded to the California State Historic Preservation Office for their review, verification and return. Copies of approval will be provided to the State Clearinghouse for information.

3. Review within 60 days of receipt and respond to all State Clearing-

house comments on proposed Army projects, explaining how the comments were acted upon and reasons therefore (comments on Environmental Impact Statements will be handled through the standard Environmental Impact Statement review process).

4. Provide within 60 days of receipt comments on proposed plans and projects of other government agencies and developers affecting the future development of the Army Installation Master Plan and other areas of Army and public mutual concern.

THE STATE CLEARINGHOUSE AGREES TO:

1. Report to the Army, undertakings proposed by State Agencies in the vicinity of the Army Installation (as defined on attached map) and in the areas of the US Army Reserve Centers that the Presidio supports (as indicated on attached map) including the following:

a. Regional and State master plans showing existing and proposed facilities and land use (when submitted for approval or revision).

b. Information regarding proposed major projects and real estate transactions planned or those projects under construction which are submitted for State Clearinghouse review.

c. Proposed sewage and/or water treatment plants.

d. Draft and Final Environmental Impact Statements (when draft statement is distributed for formal review).

e. Additional information for specific projects upon request.

2. Review and respond within 60 days of receipt to all Army comments on projects submitted to the State Clearinghouse explaining how the comments were acted upon and reasons therefore (comments on Environmental Impact Statements will be handled through the standard Environmental Impact Statement review process).

3. Provide within 60 days of receipt comments on proposed Army plans and projects affecting the functional, economic, and environmental aspects of state and regional development plans.

4. Advise the Army when submittal of information to other official bodies or presentations for public review are required.

IT IS MUTUALLY AGREED:

1. Failure to provide comments on plans and projects within the periods indicated above implies tacit agreement with those plans and projects, unless

a time extension is mutually agreed upon or additional information is submitted at a later date that substantially changes the impact.

2. Time periods to respond to comments may be extended by mutual agreement.

3. Review process details and appropriate forms will be developed to facilitate uniform and efficient exchange of comments.

4. This MEMORANDUM OF UNDERSTANDING will be reviewed annually or as required to determine the adequacy of the review process and types of projects or information which would be added to or deleted from automatic review.

5. Nothing herein shall be construed as obligating the Army or the State Clearinghouse to violate existing laws or regulations.

6. This agreement shall remain in effect until termination or revision in writing.

APPROVED:

United States Army, Presidio of San Francisco

WARREN J. LODGE
Colonel, Armor
Commanding

DATE: 12 August 1975

Office of Planning and Research
State of California

William C. Kahham

DATE: AUGUST 13, 1975

APPENDIX F:

OUTGRANT REGISTER FOR PSF

APPENDIX V
Aug 1978

Which Site?
Presidio

Marlene
PSF-225 / Con
%CRJ

OUTGRANT REGISTER

Map Ref No.	Grantee	Area and Consideration	Authority & Purpose	Period
Undef	US Dept of the Navy	Undefined $ None	E-112-377 Blanket permit to construct, operate & maintain communication facilities & use Army communication facilities.	22 Feb 1945 until revoked
5A	US Coast Guard	3.1 AC (uplands) 10.8 AC (tidelands) $ None	Permit DACA05-4-138, to use & occupy 3.1 AC of reservation land for a Coast Guard station w/add'l 10.8 AC for wharf & mooring area extending approx 400 ft into SF Bay & right to connect sewer lines to the Army sanitary sewer system.	1 Apr 1967 to 31 Mar 1982
5D	US Coast Guard	Undefined	Utilities Svc Contract DABF03-68-50017 for underground electric cable.	Renewed yearly
Undef	US Coast Guard	Undefined $ None	112-376 Blanket permit to construct, operate & maintain communication facilities & use Army communication facilities.	24 Jun 1947 until revoked
6	American Battle Monuments Commission	1.38 AC	Permit DA-04-167-ENG-~~2533~~, 15 Aug 61, to occupy a site known as the West Coast Memorial, established to honor members of Armed Forces who died in Pacific Coast waters during World War II.	Indefinite

OUTGRANT REGISTER

Map Ref No.	Grantee	Area and Consideration.	Authority & Purpose	Period
8	American National Red Cross	0.42 AC $1.00 p/a	License DACA05-3-69-9 to operate & maintain (Red Cross) Bldgs 97 & 98 on a plot of reservation land.	20 Sep 1973 to 19 Sep 1983
9A	State of California Div of Hwys	14.93 AC $ None	Easement by the then Sec of War for right-of-way to construct state highway over reservation boundary (Park-Presidio Blvd).	27 Jul 1938 until revoked
9D	State of California	100 SF $ None	Undocumented easement for ventilation Bldg 466 for operation of highway tunnel in 9A, above.	Unknown
9E	State of California	Undefined $ None	Utility Service Contract DABF03-68-S-0015, for water lines & meters to irrigate hwy landscape.	Renewed yearly
9F	State of California	0.125 AC $ None	Right of Entry to construct Gorgas Avenue Off-Ramp.	17 Jun 1969 until revoked
9G	State of California	16 SF $ None	License DACA05-3-76-501 to install, operate & maintain seismograph near Inspiration Point.	14 Jul 1975 until 13 Jul 1980

113.16

Map Ref No.	Grantee	Area and Consideration.	Authority & Purpose	Period
10A	GGBH&TD	55.02 AC $ None	Permit by the then Sec. of War, 13 Feb 1931, as amended for right-of-way to construct roads & permission to erect, operate & maintain bridge end, toll plaza & ancillary bldgs. & structures on reservation property.	13 Feb 1931 until revoked

OUTGRANT REGISTER

Map Ref No.	Grantee	Area and Consideration	Authority & Purpose	Period
10B	GGBH&TD	None $ None	Permission granted under utility service contract DABF03-68-S-0020 to install & maintain water line & meters used in furnishing toll plaza with potable water from Govt. sources.	Indefinite Renewed yearly
10C	GGBH&TD	Undefined $ None	Permit by then Sec. of War, 11 Aug 30, to construct Golden Gate Bridge across San Francisco Bay.	Indefinite
10D	GGBH&TD	Undefined $ None	Letter Permit for temporary underground communication cable tie line.	6 Sep 1972 until revoked
10E	GGBH&TD	0.09 AC $ None	License DACA05-3-75-535 to construct bicycle path within existing R/W (see 10A).	1 Aug 74 to 31 Jul 79
10F	GGBH&TD	0.24 AC± $ None	Letter Permit to construct & operate within toll area a restaurant, toilet & garage.	17 Mar 38 until revoked
11A	City & Co. of San Francisco (Julius Kahn Public Playground)	7.29 AC $ None	License by the then Sec. of War, 24 Jul 22, as amended, to use parcel of land as a public playground.	24 Jul 1922 until revoked
11B	City & Co. of San Francisco (SF Muni Bus)	None $ None	Transportation license, HQ, P6FC, to operate passenger transportation service to & from certain bus stops on the reservation.	8 Feb 1973 to 7 Feb 1983

OUTGRANT REGISTER

Map Ref No.	Grantee	Area and Consideration	Authority & Purpose	Period
11C (2)	City & Co. of San Francisco	1.00 AC $ None	73-619 Easement DACA05-2-73-619 for right-of-way to construct & maintain storm relief sewer lines across Lobos Creek area.	7-12-73 ~~Perpetuity~~ 7-11-2023
11D	City & Co. of San Francisco	Various $ None	Emergency use of PSF structures in event of civil diaster.	As required
11E	City & Co. of San Francisco	20' wide R/W $ None	Easement DA04-167-ENG-3670 for sanitary sewer extension across SE corner of reservation from Locust St. to Union St.	20 Apr 1965 to 29 Apr 2015
11H	City & Co. of San Francisco	Undefined $ None	Easement auth. by para 54(a), AR 405-80, through Utility Service Contract (renewable annually) to operate & maintain city owned water lines & meters used in supplying post w/ potable water as needed.	Indefinite
11J	City & Co. of San Francisco	Undefined $ None	Undocumented permit for portion of reservation over which city owned pipeline traverses to supply water to Presidio Golf CLub House an off-post, non-Govt owned activity, auth. unknown.	Unknown
11L	City & Co. of San Francisco	0.925AC	Undocumented permit for City of San Francisco to use portion of PSF (south of Mt Lake) as an extension of Mt. Lake Park.	Unknown
11M	City & Co. of San Francisco (Rec. & Parks Dept)	2.68 AC± Joint Use of LAIR Parking Lot $ None	License DACA05-3-73-510 permitting use of LAIR parking lot when not required by the Army. (Normally after hours.)	6 Sep 1972 until 5 Sep 1982

.ENDIX V (Continued)

OUTGRANT REGISTER

Map Ref No.	Grantee	Area and Consideration	Authority & Purpose	Period
11N	City & Co. of San Francisco	Undefined $ None	License DACA05-3-71-234 to install and operate two rain gauges.	24 Jun 1971 until 23 Jun 1981
12	Presidio Golf Club	148.5 AC $ None	Undocumented understanding which provided for reversion of Presidio Golf Course to Army control & for its operation by the Presidio Army Golf Club. Furthermore, that members of Presidio Army Golf Club & Presidio Golf Club (non-military organization) have joint use of Presidio Golf Course & Presidio Golf Club House.	Indefinite
14A	Pacific Tel & Tel	2.18 AC $9,135 pa	Easement R/W DACA05-2-72-477, to construct, operate & maintain telephone lines, cable landings, manholes & underground cables at Presidio.	19 Jul 1971 until 20 Jul 2021
14B	Pacific Tel & Tel	Undefined $ None	Undocumented right-of-way for telephone lines to provide telephone service to acquired Wherry Housing.	Indefinite
14C	Pacific Tel & Tel	Undefined $70.20 p/a	Lease DA-04-167-ENG-3502, ? to use 3 cable pairs in Govt owned communication system to provide telephone service to Wells Fargo Bank.	11 Nov 1964 to 10 Nov 1979
Undef	Pacific Tel & Tel	See Note 1 $ None	License DA-(S)-49-040-ENG-1, 11 Oct 1950, to install, operate and maintain public telephones on Dept of Army, Navy & Air Force establishments.	1 Nov 1950 until revoked

ENDIX V (Continued)

OUTGRANT REGISTER

Map Ref No.	Grantee	Area and Consideration	Authority and Purpose	Period
14E	Pacific Tel & Tel	Undefined $40.00 p/a	Lease DACA05-1-71-38 permits joint use of 16 Govt owned poles in 1600 area.	23 Apr 1970 until 22 Apr 1980
14F	Pacific Tel & Tel	Undefined $25.00 p/a	Lease DACA05-1-71-37 permits joint use of 10 Govt owned poles in 1400 area.	29 Aug 1974 until 28 Aug 1979
14G	Pacific Tel & Tel	Undefined $42.50 p/a	Lease DACA05-1-71-293 permits joint use of 17 Govt owned poles in 1200 area.	20 Jun 1970 until 19 Jun 1980
15	Western Union Tel. Co.	BLDG 35 Undefined $ % of service charges	License DA-49-040-ENG-5 2 Oct 1962, to install and maintain facilities and equipment for telegraph service for Govt and non-Govt purposes.	1 Jul 1962 until revoked
6	Air Transport Assn	Undefined $ None	Under provisions of AR 55-103, authority granted for the establishment of an air lines ticket agency on Post.	23 Jul 1956 until revoked
8	Wells Fargo Bank	2,913 SF $9,780 p/a	Lease DACA05-1-68-41, to occupy portion of Bldg S-210 for banking purposes.	5 Jan 1973 to 4 Jan 1983
9A	US Post Office	5,328 SF $ None	Under provisions of para 56, AR 405-80, portion of Bldg S-210 designated for use as Post Office.	Indefinite

·PENDIX V (Continued)

OUTGRANT REGISTER

Map Ref No.	Grantee	Area and Consideration	Authority & Purpose	Period
19B	US Post Office	500 SF $ None	Under provisions of para 56, AR 405-80, portion of Bldg 1100 designated for use as Post Office.	Indefinite
19C	US Post Office	Undefined $ None	Mailbox location, Bldg 1430	Indefinite
19D	US Post Office	Undefined $ None	Mailbox location, Bldg 416	Indefinite
19E	US Post Office	Undefined $ None	Mailbox location, Bldg 325	Indefinite
19F	US Post Office	Undefined $ None	Mailbox location, Bldg 540	Indefinite
19G	US Post Office	Undefined $ None	Mailbox location, Bldg 35	Indefinite
19H	US Post Office	Undefined $ None	Mailbox location, Bldg 220	Indefinite
19J	US Post Office	Undefined $ None	Mailbox location, Bldg 1552	Indefinite
19K	US Post Office	Undefined $ None	Mailbox location, Bldg 1516	Indefinite
19L	US Post Office	Undefined $ None	Mailbox location, Bldg 1273	Indefinite
19M	US Post Office	Undefined $ None	Mailbox location, Bldg S-210	Indefinite
19N	US Post Office	Undefined $ None	Mailbox location, Bldg 38	Indefinite
19P	US Post Office	Undefined $ None	Mailbox location, Bldg 39	Indefinite
19Q	US Post Office	Undefined $ None	Mailbox location, Bldg T-252	Indefinite

ENDIX V (Continued)

OUTGRANT REGISTER

	Grantee	Area and Consideration	Authority & Purpose	Period
	US Post Office	Undefined $ None	Mailbox location, Bldg T-1016	Indefinite
	US Post Office	Undefined $ None	Mailbox location, Bldg 1100	Indefinite
lef	Pacific Gas & Electric	See Note 2 $ None	Easement authorized under Utility Service Contract DABF03-69-C-0222 (renewable annually) to replace, operate and maintain electrical transmission lines connecting w/main post substations, switching stations and power lines.	Indefinite
def	Pacific Gas & Electric	See Note 2 $ None	Easement authorized under Utility Service Contract DABF03-69-C-0229 (renewable annually) to provide natural gas service to acquired Park Presidio Housing.	Indefinite
def	Pacific Gas & Electric	See Note 2 $ None	Utility Service Facility DAB F03-69-C-0227 (renewable annually) to replace, operate and maintain gas lines supplying entire post with gas service.	Indefinite
A	Joseph H. Rose Trustee (Permit to Mary Holt Rose) License 113-9	Undefined $ None	Permit to extend residential structure located at 3236 - 3240 Pacific Ave. (Blk 966 Parcel 4) over Presidio wall.	13 Dec 1907 until revoked
IB	Richard R. & Olga Gratton (Permit to Bruce Porter)	Undefined $ None	Permit to extend residence at 3234 Pacific Ave. (Blk 966, Parcel 3) over Presidio wall.	7 May 1901 until revoked

ENDIX V (Continued)

OUTGRANT REGISTER

Map Ref No.	Grantee	Area and Consideration	Authority and Purpose	Period
21C	Frank J. & Mary F. Gulli (permit to Bernard Famonville)	Undefined $None	Permit to extend residence at 1 Presidio Ave. (Blk 966, Parcel 1) over Presidio wall.	28 Mar 1902 until revoked
21D	John M. & Rena G. Bransten (permit to Joseph Nash)	Undefined $ None	Extension of residence at 3232 Pacific Ave. (Blk 966, Parcel 2) over Presidio wall.	7 Apr 1908 until revoked
21E	James E. & Jean L. Palmer	Undefined $ None	Extension of residence at 3198 Pacific Ave. across Presidio wall.	Unknown
21F	Kjell H. & Katherine V. Qvale	Undefined $ None	Encroaching drain pipe on installation.	Unknown
22	Prince Chas. Jr. Pipe Band	Bldg. 649 $ None	License DACA05-3-77-537 grants joint use (Fri Eve) for band practice.	1 Apr 1977 to 31 May 1980
23	Fort Point Museum Assn.	Portion of Bldg ~~T-116~~3 $1.00	Lease DACA05-1-69-171 for administration offices (Fort Point Museum)	2 Jun 1969 to 1 Jun 1982
24	US DOD DIS	Bldg 35 (3295 SF) $ None	Permit DACA05-4-77-545 for administration & storage purposes.	1 Jun 1977 to 31 May 1982
25A	Dept of the Interior, Geological Survey	5,788 SF in Bldg 1430, Btry McKinnon Stotsenburg $ None	Permit DACA05-4-67-120, for space to be used as an experimental station for evaluation of instruments used in earthquake research.	23 Mar 67 ~~8 Jul 1971~~ to 23 Mar ~~1979~~ 1984

APPENDIX G:

UNDERGROUND STORAGE TANKS AT PSF

APPENDIX G:

UNDERGROUND STORAGE TANKS AT PSF[a]

Under or Near Building	Tank Size (gal)	Tank Construction Material	Contains or Once Contained	Current Status
2	550	Unknown	Oil	Unknown
5	100	Unknown	Oil	Unknown
6	100	Unknown	Oil	Unknown
7	100	Unknown	Oil	Unknown
8	100	Unknown	Oil	Unknown
9	100	Unknown	Oil	Unknown
10	100	Unknown	Oil	Unknown
11	100	Unknown	Oil	Unknown
12	100	Unknown	Oil	Unknown
13	100	Unknown	Oil	Unknown
14	100	Unknown	Oil	Unknown
15	100	Unknown	Oil	Unknown
16	100	Unknown	Oil	Unknown
21	Unknown	Unknown	Burner oil	Inactive
34	Unknown	Unknown	Unknown	Unknown
35	100	Unknown	Oil	Unknown
38	100	Unknown	Generator fuel oil	In Use
39	100	Unknown	Oil	Unknown
42	Unknown	Unknown	Oil	Unknown
45	Unknown	Unknown	Oil	Unknown
51	Unknown	Unknown	Oil	Unknown
56	Unknown	Unknown	Oil	Unknown
57	Unknown	Unknown	Oil	Unknown
58	Unknown	Unknown	oiL	Unknown
59	Unknown	Unknown	Oil	Unknown
63	Unknown	Unknown	Oil	Unknown
64	Unknown	Unknown	Oil	Unknown
65	Unknown	Unknown	Oil	Unknown
68	300	Unknown	Generator fuel oil	In use
99	Unknown	Unknown	Oil	Unknown
100	Unknown	Unknown	Oil	Unknown
101	Unknown	Unknown	Oil	Unknown
102	Unknown	Unknown	Oil	Unknown
103	Unknown	Unknown	Fuel oil	Unknown
104	Unknown	Unknown	Oil	Unknown
105	Unknown	Unknown	Oil	Unknown
106	Unknown	Unknown	Oil	Unknown
122	Unknown	Unknown	Oil	Unknown
123	Unknown	Unknown	Fuel oil	Unknown
124	Unknown	Unknown	Oil	Unknown

Under or Near Building	Tank Size (gal)	Tank Construction Material	Contains or Once Contained	Current Status
125	Unknown	Unknown	Fuel oil	Unknown
126	Unknown	Unknown	Oil	Unknown
127	Unknown	Unknown	Oil	Unknown
128	Unknown	Unknown	Fuel oil	Unknown
129	Unknown	Unknown	Oil	Unknown
130	Unknown	Unknown	Oil	Unknown
135	Unknown	Unknown	Fuel oil	Unknown
205	300	Unknown	Fuel gas	In use
206	Unknown	Unknown	Unknown	Unknown
207-1	10,000	Fiberglass	Gasoline	In use
207-2	10,000	Fiberglass	Gasoline	In use
207-3	10,000	Fiberglass	Gasoline	In use
210	Unknown	Unknown	Unknown	Unknown
210	Unknown	Unknown	Unknown	Unknown
220	Unknown	Unknown	Unknown	Unknown
228-1	Unknown	Unknown	Dry cleaning solvent	Unknown
228-2	Unknown	Unknown	Dry cleaning solvent	Unknown
231	500	Unknown	Waste oil	In use
269	1,500	Concrete	Pesticide wash	In use
325	Unknown	Unknown	Oil	Unknown
326	Unknown	Unknown	Oil	Unknown
327	Unknown	Unknown	Oil	Unknown
328	Unknown	Unknown	Oil	Unknown
329	Unknown	Unknown	Oil	Unknown
330	Unknown	Unknown	Oil	Unknown
331	Unknown	Unknown	Oil	Unknown
332	Unknown	Unknown	Oil	Unknown
333	Unknown	Unknown	Oil	Unknown
334	Unknown	Unknown	Oil	Unknown
335	Unknown	Unknown	Oil	Unknown
336	Unknown	Unknown	Oil	Unknown
337	Unknown	Unknown	Oil	Unknown
338	Unknown	Unknown	Oil	Unknown
339	Unknown	Unknown	Oil	Unknown
340	Unknown	Unknown	Oil	Unknown
341-1	Unknown	Unknown	Oil	Unknown
341-2	Unknown	Unknown	Oil	Unknown
342	Unknown	Unknown	Oil	Unknown
343	Unknown	Unknown	Fuel oil	Unknown
344	Unknown	Unknown	Oil	Unknown

Under or Near Building	Tank Size (gal)	Tank Construction Material	Contains or Once Contained	Current Status
345	Unknown	Unknown	Oil	Unknown
510	Unknown	Unknown	Oil	Unknown
511	Unknown	Unknown	Oil	Unknown
512	Unknown	Unknown	Fuel oil	Unknown
513	Unknown	Unknown	Oil	Unknown
514	Unknown	Unknown	Oil	Unknown
515[b]	Unknown	Unknown	Oil	Unknown
530	Unknown	Unknown	Oil	Unknown
531	Unknown	Unknown	Oil	Unknown
534	Unknown	Unknown	Unknown	Unknown
540	Unknown	Unknown	Oil	Unknown
541	Unknown	Unknown	Oil	Unknown
542	Unknown	Unknown	Fuel oil	Unknown
543	Unknown	Unknown	Oil	Unknown
544	Unknown	Unknown	Fuel oil	Unknown
545	Unknown	Unknown	Oil	Unknown
546	Unknown	Unknown	Oil	Unknown
547	Unknown	Unknown	Oil	Unknown
548	Unknown	Unknown	Fuel oil	Unknown
549	Unknown	Unknown	Oil	Unknown
550	Unknown	Unknown	Oil	Unknown
551	Unknown	Unknown	Oil	Unknown
572	500	Unknown	Generator fuel oil	In use
603	Unknown	Unknown	Heat oil	In use
619[c]	275	Steel	Oil	Unknown
624[d]	Unknown	Unknown	Unknown	Unknown
628[c]	275	Steel	Oil	Unknown
645	300	Unknown	Generator fuel oil	In use
649	Unknown	Unknown	Unknown	Unknown
650	Unknown	Unknown	Oil	Unknown
651	Unknown	Unknown	Fuel oil	Unknown
652	Unknown	Unknown	Oil	Unknown
662[c]	Unknown	Unknown	Unknown	Unknown
715	Unknown	Unknown	Oil	Unknown
716	Unknown	Unknown	Oil	Unknown
717	Unknown	Unknown	Oil	Unknown
718	Unknown	Unknown	Oil	Unknown
719	Unknown	Unknown	Oil	Unknown
720	Unknown	Unknown	Oil	Unknown
721	Unknown	Unknown	Oil	Unknown
722	Unknown	Unknown	Oil	Unknown
723	Unknown	Unknown	Oil	Unknown
724	Unknown	Unknown	Oil	Unknown

Under or Near Building	Tank Size (gal)	Tank Construction Material	Contains or Once Contained	Current Status
725	Unknown	Unknown	Oil	Unknown
726	Unknown	Unknown	Oil	Unknown
727	Unknown	Unknown	Oil	Unknown
728	Unknown	Unknown	Oil	Unknown
729	Unknown	Unknown	Oil	Unknown
730	Unknown	Unknown	Oil	Unknown
731	Unknown	Unknown	Oil	Unknown
732	Unknown	Unknown	Oil	Unknown
733	Unknown	Unknown	Oil	Unknown
742	Unknown	Unknown	Oil	Unknown
743	Unknown	Unknown	Oil	Unknown
744	Unknown	Unknown	Oil	Unknown
745	Unknown	Unknown	Oil	Unknown
746	Unknown	Unknown	Oil	Unknown
747	Unknown	Unknown	Oil	Unknown
748	Unknown	Unknown	Oil	Unknown
749	Unknown	Unknown	Oil	Unknown
750	1,500	Unknown	Heating oil	Unknown
751	Unknown	Unknown	Heating oil	Unknown
752	Unknown	Unknown	Oil	Unknown
753	Unknown	Unknown	Oil	Unknown
754	Unknown	Unknown	Oil	Unknown
755	Unknown	Unknown	Oil	Unknown
756	Unknown	Unknown	Oil	Unknown
757	Unknown	Unknown	Oil	Unknown
758	Unknown	Unknown	Oil	Unknown
759	Unknown	Unknown	Oil	Unknown
760	Unknown	Unknown	Oil	Unknown
924	400	Unknown	Waste oil	Unknown
926	Unknown	Unknown	Oil	Unknown
926-1[e]	10,000	Unknown	Gasoline	Unknown
926-2[e]	10,000	Unknown	Gasoline	Unknown
926-3[e]	10,000	Unknown	Gasoline	Unknown
926-4[e]	10,000	Unknown	Gasoline	Unknown
934	Unknown	Unknown	Unknown	Unknown
937-1	1,000	Unknown	Waste oil	Unknown
937-2	1,000	Unknown	Waste solvents	Unknown
937-3	1,000	Unknown	Xylene	Unknown
975	5,000	Unknown	Gasoline	Inactive
979-1	500	Unknown	Waste oil	Inactive
979-2	1,000	Unknown	Gasoline	Inactive
1027	10,000	Unknown	Diesel	Inactive
1029[c]	Unknown	Unknown	Oil	Unknown

Under or Near Building	Tank Size (gal)	Tank Construction Material	Contains or Once Contained	Current Status
1040	20,000	Unknown	Fuel oil	Unknown
1047	Unknown	Unknown	Oil	Unknown
1065	Unknown	Unknown	Oil	Unknown
1100	3,000	Unknown	Generator fuel oil	In use
1110-1	4,000	Unknown	Generator fuel oil	In use
1110-2	2,000	Unknown	Generator fuel oil	In use
1214	500	Unknown	Generator fuel oil	In use
1201	Unknown	Unknown	Oil	Unknown
1202	Unknown	Unknown	Oil	Unknown
1203	Unknown	Unknown	Oil	Unknown
1204	Unknown	Unknown	Oil	Unknown
1205	Unknown	Unknown	Oil	Unknown
1206	Unknown	Unknown	Oil	Unknown
1207	Unknown	Unknown	Oil	Unknown
1208	Unknown	Unknown	Oil	Unknown
1213	Unknown	Unknown	Oil	Unknown
1214	Unknown	Unknown	Oil	Unknown
1216	Unknown	Unknown	Oil	Unknown
1217	Unknown	Unknown	Oil	Unknown
1218	Unknown	Unknown	Oil	Unknown
1224	Unknown	Unknown	Unknown	Inactive
1244	Unknown	Unknown	Oil	Unknown
1260	Unknown	Unknown	Unknown	Unknown
1264	Unknown	Unknown	Unknown	Unknown
1276	Unknown	Unknown	Oil	Unknown
1277	Unknown	Unknown	Oil	Unknown
1273	Unknown	Unknown	Oil	Unknown
1274	Unknown	Unknown	Oil	Unknown
1275	Unknown	Unknown	Oil	Unknown
1276	Unknown	Unknown	Oil	Unknown
1277	Unknown	Unknown	Oil	Unknown
1289	Unknown	Unknown	Oil	Unknown
1277	Unknown	Unknown	Oil	Unknown
1290	Unknown	Unknown	Oil	Unknown
1291	Unknown	Unknown	Oil	Unknown
1293	Unknown	Unknown	Oil	Unknown
1294	Unknown	Unknown	Oil	Unknown
1295	Unknown	Unknown	Oil	Unknown
1296	Unknown	Unknown	Oil	Unknown
1297	Unknown	Unknown	Oil	Unknown
1298	Unknown	Unknown	Oil	Unknown
1300	Unknown	Unknown	Oil	Unknown
1301	Unknown	Unknown	Oil	Unknown

Under or Near Building	Tank Size (gal)	Tank Construction Material	Contains or Once Contained	Current Status
1302	Unknown	Unknown	Oil	Unknown
1303	Unknown	Unknown	Oil	Unknown
1304	Unknown	Unknown	Oil	Unknown
1306[c]	Unknown	Unknown	Oil	Unknown
1308	Unknown	Unknown	Oil	Unknown
1310	Unknown	Unknown	Oil	Unknown
1314	Unknown	Unknown	Oil	Unknown
1320	Unknown	Unknown	Oil	Unknown
1322	Unknown	Unknown	Oil	Unknown
1324	Unknown	Unknown	Oil	Unknown
1326	Unknown	Unknown	Oil	Unknown
1328	Unknown	Unknown	Oil	Unknown
1330	Unknown	Unknown	Oil	Unknown
1334	Unknown	Unknown	Oil	Unknown
1337	Unknown	Unknown	Oil	Unknown
1357	Unknown	Unknown	Fuel oil	Unknown
1648	Unknown	Unknown	Oil	Unknown
1750	Unknown	Unknown	Oil	Unknown
1794	300	Unknown	Generator fuel gas	Unknown
1800-1	17,000	Unknown	Diesel	In use
1800-2	17,000	Unknown	Diesel	In use
1800-3	1,000	Unknown	Diesel	In use
1800-4	500	Unknown	Diesel	In use
1800-5	500	Unknown	Unleaded	In use
1802	2500	Unknown	Generator fuel oil	In use
1818	Unknown	Unknown	Oil	Unknown

[a]This list was compiled from information reported by various PSF personnel familiar with the various listed facilities and buildings. No documentation on any of these tanks could be located, however.

[b]Now called Bldg. 1.

[c]Building has been razed.

[d]Old gas pump house.

[e]Tank reportedly removed in 1942, but no confirmatory evidence available.

APPENDIX H:

REGISTERED UNDERGROUND STORAGE TANKS AT PSF

BUSINESS NAME: Presidio of San Francisco

ADDRESS: Presidio, San Francisco

HAZARDOUS MATERIALS DISCLOSURE FORM

DATE: 10 MAR 1987

PAGE 1 OF 2

1. Brand Name or Product Name	2. Common Name	3. Hazardous Substances in Product	4. CAS # (Chemical Abstracts Service Number)	5. Hazard Class (Table 1)	6. UN or NA # or CA Waste #	7. Container Type(s) (Table 2)	8. Maximum Quantity Stored at Any Time (gal.)	9. Appoximate Total Quantity Used Each Year (gal.)	For Office Use Only: MSDS	Location		704
Petroleum Fuel	Unleaded Gasoline	Petroleum Hydrocarbons	68476302	03	UN1203	H	10,000	1,188,000				
" "	" "	" "	"	03	UN1203	H	10,000	288,000				
" "	Regular Gasoline	" "	"	03	UN1203	H	10,000	180,000				
" "	" "	" "	"	08	UN1203	H	10,000	48,000				
" "	Premium Gasoline	" "	"	08	UN1203	H	10,000	456,000				
" "	" "	" "	"	08	UN 1203	H	10,000	60,000				
" "	" "	" "	"	09	UN 1203	H	10,000	60,000				
Diesel	Fuel Oil #2	" "	"	08	NA 1993	H	4,000					
"	"	" "	"	08	NA 1993	H	6,000					
"	"	" "	"	08	NA 1993	H	2,000					
"	"	" "	"	08	NA 1993	H	350	250				
"	"	" "	"	08	NA 1993	H	300	200				
Petroleum Fuel	Unleaded Gasoline	" "	"	08	UN 1203	H	300	150				
" "	" "	" "	"	08	UN 1203	H	300	150				
" "	" "	" "	"	08	UN 1203	H	300	150				
Diesel	Fuel #2	" "	"	08	NA 1993	H	17,000					
"	"	" "	"	08	NA 1993	H	17,000					
"	"	" "	"	08	NA 1993	H	1,000					
"	"	" "	"	08	NA 1993	H	1,000					
"	"	" "	"	08	NA 1993	H	1,000	350				
"	"	" "	"	08	NA 1993	H	7,000	3,500				
"	"	" "	"	08	NA 1993	H	10,000					
Waste Oil	Vehicle Waste Oil	Hydrocarbons, metals		08	NA 1270	H	1,200					
" "	" " "	" "		08	NA 1270	H	300					

BUSINESS NAME: Presidio of San Francisco

HAZARDOUS MATERIALS DISCLOSURE FORM

DATE: 10 MAR 1987

PAGE 2 OF 2

ADDRESS: Presidio

1. Brand Name or Product Name	2. Common Name	3. Hazardous Substances in Product	4. CAS # (Chemical Abstracts Service Number)	5. Hazard Class (Table 1)	6. UN or NA # or CA Waste #	7. Container Type(s) (Table 2)	8. Maximum Quantity Stored at Any Time (gal.)	9. Total Quantity Used Each Year (gal.)	For Office Use Only: MSDS	Location		704
Diesel	Fuel Oil#2	Petroleum Hydrocarbon	68476302	08	NA 1993	G	100,000					
"	"	" "	"	08	NA 1993	G	15,000					
"	"	" "	"	08	NA 1993	G	5,000					
"	"	" "	"	08	NA 1993	G	5,000					
"	"	" "	"	08	NA 1993	G	5,000					
"	"	" "	"	08	NA 1993	G	500					
"	"	" "	"	08	NA 1993	G	600	350				
"	"	" "	"	08	NA 1993	G	500	1,000				
"	"	" "	"	08	NA 1993	G	500	600				
"	"	" "	"	08	NA 1993	G	500	250				
Petroleum Fuel	Unleaded Gasoline	" "	"	03	UN 1203	G	20,000					
" "	" "	" "	"	03	UN 1203	G	20,000					
" "	" "	" "	"	03	UN 1203	G	20,000					
Wastewater	Pesticide Wash Water			18	NA 2210	H	1,500					

+ Map with Tank locations

APPENDIX I:

PESTICIDES USED

FORDS DURSBAN 4E INSECTICIDE

Chlorpyrifos (0,0 Digthyl 0 (3,5,6 Trichloro 2 pyridyl) Phosphorothioate	44.8%
Aroniatic Petroleum Distillate	46.3%
Inert Ingredients	8.9%

EPA Number: 10370-65

GORDONS SUPER TRIMIC BROADLEAF HERBICIDE

Isoctyl Ester of 2,4-Dichlorophenoxy-Acetic Acid	32.48%
Butoxyethanol Ester of 2-(2,4 Dichloro-Phenoxy) Propionic Acid	30.66%
Dicamba (3,6-Dichloro-O-Anisic Acid)	5.38%
Inert Ingredients	31.48%

EPA Number: 2217-651

MONSANTO ROUND-UP HERBICIDE

Isopropylamine Salt of Glyphosate	41.0%
Inert Ingredients	59.0%

EPA Number: 524-308 AA

PRENTOX DIAZINON 4E INSECTICIDE

Diazinon (0,0-Diethyl 0 (2 Isopropyl-6-Methyl-4-Pyrimidinyl) Phosphorothioate	47.5%
Xylene Range Aromatic Solvent	30.0%
Inert Ingredients	25.5%

EPA Number: 655-457-6830

MALATHION

(0,0-Dimetyl) Dithiophosphate of Diethyl Mercaptosuccinate	57.0%
Inert Ingredients	43.0%

EPA Number: 8329-11

*SCOTTS PROTURF FLUID FUNGICIDE III

1-(4-Chlorophenoxy)-3,3 Dimethyl-1-(1H-1,2,4-Triazol-1-yl)-2-Butanone	1.59%
Thiram, Tetramethylthiuram Disulfide	40.76%
Inert Ingredients	57.65%

EPA Number: 538-216

*BAYLETON FUNGICIDE

1-(4-Chlorophenoxy)-3,3 Dimethyl-1-(1H-1,2,4-Triazol-1-yl)-2-Butanone	25.0%
Thiram, Tetramethylthiuram Disulfide	75.0%

EPA Number: 538-216

* Applied on Golf Course

*GORDONS TRIMEC BENTGRASS FORMULA

Dimethylamine Salt of 2-CZ-Methyl-4-Chlorophenoxy Propionic Acid	19.84%
Dimethylamine Salt of 2,4-Dichlorophenoxy Acitic Acid	6.12%
Dimethylmine Salt of Dicamba (3,6-Dichloro-O-Anisic Acid)	2.53%
Inert Ingredients	71.51%

EPA Number: 2217-529

*VORLAN FUNGICIDE

3-(3,5 Dichlorophenyl) 5-Ethenyl-5-Methyl-2,4 Oxazolidinedione	50.0%
Inert Ingredients	50.0%

EPA Number: 372-56

*BULTRIC HERBICIDE

Octanoic Acid Ester of Bromoxynil (3,5 Dibromo-4-Mydroxbenzontile	33.8%
Inert Ingredients	66.2%

EPA Number: 359-564

*FORE TURF FUNGICIDE

Manganese	16.0%
Zinc	2.0%
Ethylene Bisdithiocarbamate	62.0%
Inert Ingredients	20.0%

EPA Number: 707-87

APPENDIX J:

ANALYTICAL RESULTS OF WATER SAMPLES, 1988

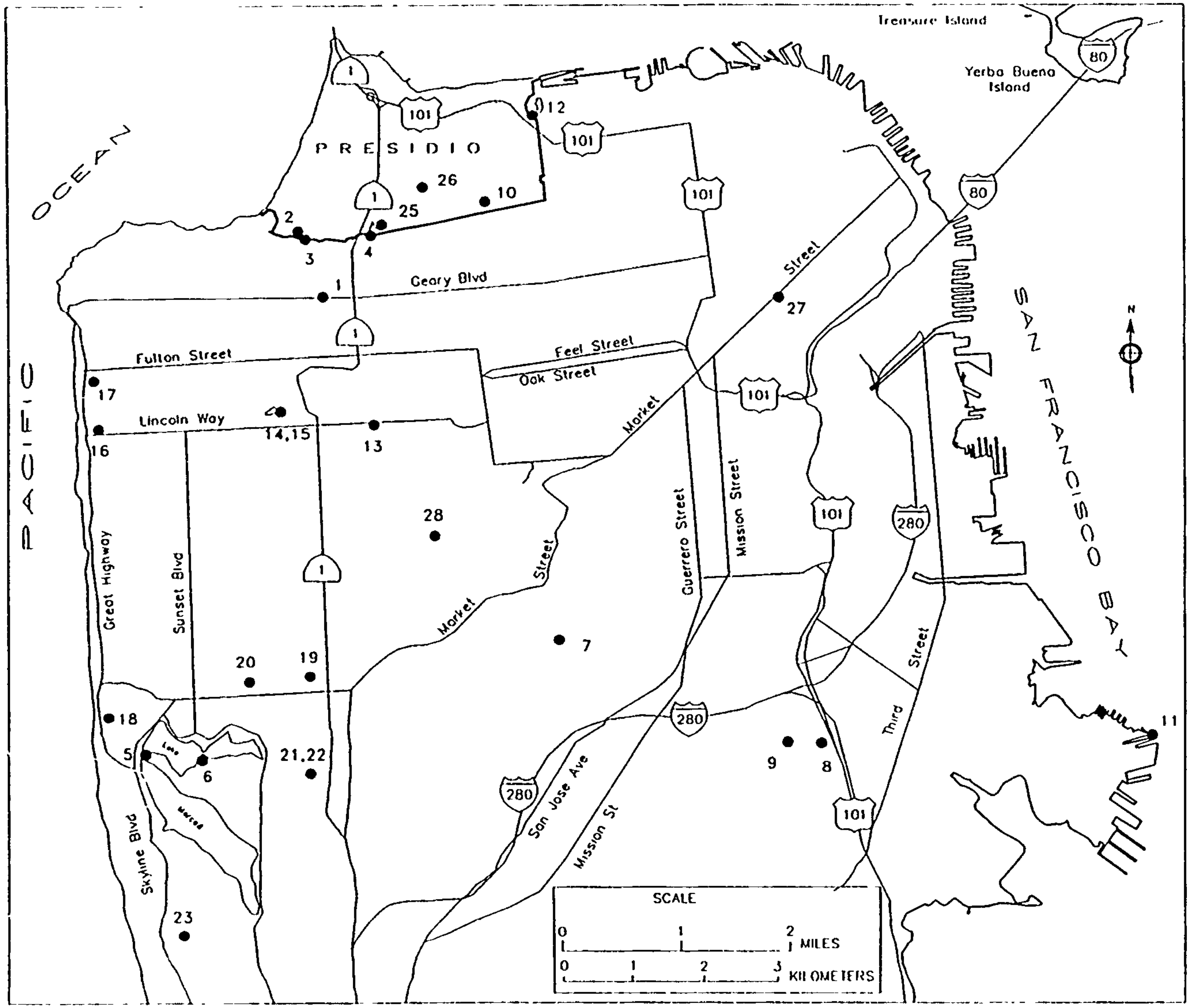

FIGURE J-1 Locations of 1988 Water Quality Sampling Sites

ANALYTICAL RESULTS FROM
SAMPLING CONDUCTED 4-7 OCT 88

PRESIDIO OF SAN FRANCISCO, CA

Station	1	2	3	4
Analyte	Lobos Creek Influent at Lincoln CREEK	Well No. 6 Bldg 1780 WELL	Well No. 13 Bldg 1785 WELL	Mountain Lake South Side LAKE
Metals (in mg/L):				
Arsenic	<.001	.001	.001	.002
Barium	.019	.031	.031	.056
Cadmium	<.0005	<.0005	<.0005	<.0005
Calcium	30.1	25.1	28.9	36.7
Calcium Hardness	245	192	201	283
Copper	<.020	<.020	<.020	<.020
Chromium	<.020	<.020	<.020	<.020
Iron	.211	<.100	<.100	.329
Lead	.001	<.001	<.001	.005
Magnesium	41.3	31.3	33.7	46.4
Manganese	.076	<.030	<.030	.224
Selenium	<.001	<.001	<.001	<.001
Silver	<.020	<.020	<.020	<.020
Sodium	34.4	29.0	31.1	63.3
Zinc	.143	.041	.017	<.010
Inorganics (in mg/L unless otherwise noted):				
Chloride	44	42	51	110
Color (Color Units)	10	<5.0	<5.0	40
Conductivity (umhos/cm)	620	500	560	800
Fluoride	.12	.14	.15	.17
Nitrite/Nitrate	9.3	7.0	8.8	.20
pH (lab)	7.9	7.4	7.7	7.9
Sulfate	47	37	38	50
Total Alkalinity	170	130	150	190
TDS	360	380	340	470
Turbidity (NTUs)	.38	<.20	<.20	6.7
Radiological (in picocuries/L):				
Gross Alpha and Gross Beta particle emissions - data to be forwarded.				
Tritium	<510	<520	<510	<520
Pesticides/Herbicides (in ug/L):				
HCB	<.80	<.80	.80	.80
Alpha-BHC	<.20	<.20	.20	.20
Beta-BHC	<.20	<.20	.20	.20
Delta-BHC	<.20	<.20	<.20	<.20
Lindane	<.08	<.08	<.08	<.08
O,P'-DDD	<.40	<.40	<.40	<.40
P,P'-DDD	<.40	<.40	<.40	<.40
O,P'-DDE	<.40	<.40	<.40	<.40
P,P'-DDE	<.40	<.40	<.40	<.40
O,P'-DDT	<.60	<.60	<.60	<.60
	4 Oct 88 0745	4 Oct 88 0800	4 Oct 88 0825	4 Oct 88 0930

Station	1	2	3	4
Analyte	Lobos Creek Influent	Well No. 6 Bldg 1780	Well No. 12 Bldg 1785	Mountain Lake South Side
P,P'-DDT	<.60	<.60	<.60	<.60
Aldrin	<.16	<.16	<.16	<.16
Dieldrin	<.24	<.24	<.24	<.24
Endrin	<.04	<.04	<.04	<.04
Endrin Aldehyde	<1.0	<1.0	<1.0	<1.0
Chlordane	<1.2	<1.2	<1.2	<1.2
Chlordane metab.	<1.2	<1.2	<1.2	<1.2
Trans-Chlordane	<.16	<.16	<.16	<.16
Cis-Chlordane	<.16	<.16	<.16	<.16
Oxychlordane	<.16	<.16	<.16	<.16
Endosulfan I	<.60	<.60	<.60	<.60
Endosulfan II	<.60	<.60	<.60	<.60
Endosulfan Sulfate	<.60	<.60	<.60	<.60
Heptachlor	<.08	<.08	<.08	<.08
Heptachlor Epoxide	<.16	<.16	<.16	<.16
Methoxychlor	<1.6	<1.6	<1.6	<1.6
Mirex	<.40	<.40	<.40	<.40
Toxaphene	<1.6	<1.6	<1.6	<1.6
PCB (Aroclor 1242)	<.80	<.80	<.80	<.80
PCB (Aroclor 1248)	<.80	<.80	<.80	<.80
PCB (Aroclor 1254)	<.80	<.80	<.80	<.80
PCB (Aroclor 1260)	<.80	<.80	<.80	<.80
Diazinon	<1.0	<1.0	<1.0	<1.0
Methyl Parathion	<.60	<.60	<.60	<.60
Parathion	<.40	<.40	<.40	<.40
Malatnion	<1.6	<1.6	<1.6	<1.6
Chlorpyrifos	<.24	<.24	<.24	<.24
Ronnel	<.20	<.20	<.20	<.20

Station

Analyte	5 S. Lake Merced W. Boat Dock LAKE	6 N. Lake Merced Bridge LAKE	7 Glen Canyon East Valley SPRING	8 McLarin-Shelley Drive SPRING
Metals (in mg/L):				
Arsenic	.003	.004	<.001	<.001
Barium	.034	.052	.138	.038
Cadmium	<.0005	<.0005	<.0005	<.0005
Calcium	31.8	37.7	35.0	19.6
Calcium Hardness	227	273	241	147
Copper	<.020	<.020	<.020	<.020
Chromium	<.020	<.020	<.020	<.020
Iron	<.100	<.100	.963	<.100
Lead	.001	.001	<.001	.003
Magnesium	35.8	43.5	37.2	23.9
Manganese	.073	.142	.701	<.030
Selenium	<.001	<.001	<.001	<.001
Silver	<.020	<.020	<.020	<.020
Sodium	64.8	69.6	92.5	25.7
Zinc	<.010	<.010	.085	<.010
Inorganics (in mg/L unless otherwise noted):				
Chloride	87	72	110	35
Color (Color Units)	20	50	15	<5.0
Conductivity (umhos/cm)	400	440	850	390
Fluoride	.43	.17	.32	.12
Nitrite/Nitrate	.09	<.05	2.4	2.9
pH (lab)	8.5	8.6	8.1	6.9
Sulfate	22	22	70	25
Total Alkalinity	190	250	220	110
TDS	260	270	500	250
Turbidity (NTUs)	7.4	24	2.3	<.20
Radiological (in picocuries/L): 10^{-12} pCi/L				
Gross Alpha and Gross Beta particle emissions - data to be forwarded.				
Tritium	<520	<510	<510	<510
Pesticides/Herbicides (in ug/L):				
HCB	<.80	<.80	<.80	<.80
Alpha-BHC	<.20	<.20	<.20	<.20
Beta-BHC	<.20	<.20	<.20	<.20
Delta-BHC	<.20	<.20	<.20	<.20
Lindane	<.08	<.08	.08	.08
O,P'-DDD	<.40	<.40	.40	.40
P,P'-DDD	<.40	.40	.40	.40
O,P'-DDE	<.40	.40	.40	.40
P,P'-DDE	<.40	<.40	.40	<.40
O,P'-DDT	<.60	<.60	<.60	<.60
P,P'-DDT	<.60	<.60	<.60	<.60
Aldrin	<.16	<.16	<.16	<.16
Dieldrin	<.24	<.24	<.24	<.24
Endrin	<.04	<.04	<.04	<.04
Endrin Aldehyde	<1.0	<1.0	<1.0	<1.0
Chlordane	<1.2	<1.2	<1.2	<1.2
	4 Oct 88 1030	4 Oct 88 1130	4 Oct 88 1200	4 Oct 88 1230

Station Analyte	5 S. Lake Merced W. Boat Dock	6 N. Lake Merced Bridge	7 Glen Canyon East Valley	8 McLarin-Shelley Drive
Chlordane metab.	<1.2	<1.2	<1.2	<1.2
Trans-Chlordane	<.16	<.16	<.16	<.16
Cis-Chlordane	<.16	<.16	<.16	<.16
Oxychlordane	<.16	<.16	<.16	<.16
Endosulfan I	<.60	<.60	<.60	<.60
Endosulfan II	<.60	<.60	<.60	<.60
Endosulfan Sulfate	<.60	<.60	<.60	<.60
Heptachlor	<.08	<.08	<.08	<.08
Heptachlor Epoxide	<.16	<.16	<.16	<.16
Methoxychlor	<1.6	<1.6	<1.6	<1.6
Mirex	<.40	<.40	<.40	<.40
Toxaphene	<1.6	<1.6	<1.6	<1.6
PCB (Aroclor 1242)	<.80	<.80	<.80	<.80
PCB (Aroclor 1248)	<.80	<.80	<.80	<.80
PCB (Aroclor 1254)	<.80	<.80	<.80	<.80
PCB (Aroclor 1260)	<.80	<.80	<.80	<.80
Diazinon	<1.0	<1.0	<1.0	<1.0
Methyl Parathion	<.60	<.60	<.60	<.60
Parathion	<.40	<.40	<.40	<.40
Malathion	<1.6	<1.6	<1.6	<1.6
Chlorpyrifos	<.24	<.24	<.24	<.24
Ronnel	<.20	<.20	<.20	<.20

Station	9	10	11	12
Analyte	Lake McNab	El Polan Spring	Hunter's Point	Palace of Fine Arts
Chlordane metab.	<1.2	<1.2	<1.2	<1.2
Trans-Chlordane	<.16	<.16	<.16	<.16
Cis-Chlordane	<.16	<.16	<.16	<.16
Oxychlordane	<.16	<.16	<.16	<.16
Endosulfan I	<.60	<.60	<.60	<.60
Endosulfan II	<.60	<.60	<.60	<.60
Endosulfan Sulfate	<.60	<.60	<.60	<.60
Heptachlor	<.08	<.08	<.08	<.08
Heptachlor Epoxide	<.16	<.16	<.16	<.16
Methoxychlor	<1.6	<1.6	<1.6	<1.6
Mirex	<.40	<.40	<.40	<.40
Toxaphene	<1.6	<1.6	<1.6	<1.6
PCB (Aroclor 1242)	<.80	<.80	<.80	<.80
PCB (Aroclor 1248)	<.80	<.80	<.80	<.80
PCB (Aroclor 1254)	<.80	<.80	<.80	<.80
PCB (Aroclor 1260)	<.80	<.80	<.80	<.80
Diazinon	<1.0	<1.0	<1.0	<1.0
Methyl Parathion	<.60	<.60	<.60	<.60
Parathion	<.40	<.40	<.40	<.40
Malathion	<1.6	<1.6	<1.6	<1.6
Chlorpyrifos	<.24	<.24	<.24	<.24
Ronnel	<.20	<.20	<.20	<.20

Station	13	14	15	16
Analyte	Arboretum	Elk Glen Well	Elk Glen Lake	Murphy Windmill
	WELL	WELL	LAKE	WELL
Metals (in mg/L):				
Arsenic	<.001	<.001	<.001	.002
Barium	.019	.020	.021	.024
Cadmium	<.0005	<.0005	.0005	.0008
Calcium	32.5	37.7	27.0	22.9
Calcium Hardness	254	268	197	160
Copper	<.020	<.020	<.020	<.020
Chromium	<.020	<.020	<.020	.027
Iron	.134	<.100	<.100	.262
Lead	.007	.001	<.001	<.001
Magnesium	41.9	42.2	31.5	24.9
Manganese	<.030	<.030	<.030	<.030
Selenium	<.001	<.001	<.001	<.001
Silver	<.020	<.020	<.020	<.020
Sodium	25.5	27.5	24.5	23.4
Zinc	.081	<.010	<.010	<.010
Inorganics (in mg/L unless otherwise noted):				
Chloride	31	57	37	35
Color (Color Units)	<5.0	<5.0	5.0	5.0
Conductivity (umhos/cm)	580	630	480	410
Fluoride	.10	<.10	.10	.10
Nitrite/Nitrate	13.0	16.0	12.0	4.1
pH (lab)	7.4	7.7	8.3	7.8
Sulfate	34	45	30	18
Total Alkalinity	190	150	130	120
TDS	360	400	300	260
Turbidity (NTUs)	<.21	<.21	.82	2.8
Radiological (in picocuries/L):				
Gross Alpha and Gross Beta particle emissions - data to be forwarded.				
Tritium	<490	<510	<530	<490
Pesticides/Herbicides (in ug/L):				
HCB	<.80	<.80	<.80	<.80
Alpha-BHC	<.20	<.20	<.20	<.20
Beta-BHC	<.20	<.20	<.20	<.20
Delta-BHC	<.20	<.20	<.20	<.20
Lindane	<.08	<.08	<.08	.08
O,P'-DDD	<.40	<.40	<.40	.40
P,P'-DDD	.40	.40	.40	.40
O,P'-DDE	<.40	.40	.40	.40
P,P'-DDE	<.40	.40	<.40	<.40
O,P'-DDT	<.60	.60	<.60	<.60
P,P'-DDT	<.60	<.60	<.60	<.60
Aldrin	<.16	<.16	<.16	<.16
Dieldrin	<.24	<.24	<.24	<.24
Endrin	<.04	<.04	<.04	<.04
Endrin Aldehyde	<1.0	<1.0	<1.0	<1.0
Chlordane	<1.2	<1.2	<1.2	<1.2
	6 Oct 88 0850	6 Oct 88 0912	6 Oct 88 0920	6 Oct 88 0950

Station	13	14	15	16
Analyte	Arboretum	Elk Glen Well	Elk Glen Lake	Murphy Windmill
Chlordane metab.	<1.2	<1.2	<1.2	<1.2
Trans-Chlordane	<.16	<.16	<.16	<.16
Cis-Chlordane	<.16	<.16	<.16	<.16
Oxychlordane	<.16	<.16	<.16	<.16
Endosulfan I	<.60	<.60	<.60	<.60
Endosulfan II	<.60	<.60	<.60	<.60
Endosulfan Sulfate	<.60	<.60	<.60	<.60
Heptachlor	<.08	<.08	<.08	<.08
Heptachlor Epoxide	<.16	<.16	<.16	<.16
Methoxychlor	<1.6	<1.6	<1.6	<1.6
Mirex	<.40	<.40	<.40	<.40
Toxaphene	<1.6	<1.6	<1.6	<1.6
PCB (Aroclor 1242)	<.80	<.80	<.80	<.80
PCB (Aroclor 1248)	<.80	<.80	<.80	<.80
PCB (Aroclor 1254)	<.80	<.80	<.80	<.80
PCB (Aroclor 1260)	<.80	<.80	<.80	<.80
Diazinon	<1.0	<1.0	<1.0	<1.0
Methyl Parathion	<.60	<.60	<.60	<.60
Parathion	<.40	<.40	<.40	<.40
Malathion	<1.6	<1.6	<1.6	<1.6
Chlorpyrifos	<.24	<.24	<.24	<.24
Ronnel	<.20	<.20	<.20	<.20

Station Analyte	17 (North) Dutch Windmill WELL	18 S.F. Zoo WELL	19 Stern Grove WELL	20 Pine Lake LAKE
Metals (in mg/L):				
Arsenic	.001	<.001	<.001	.003
Barium	.021	.029	.028	.155
Cadmium	.0005	.0005	.0009	.0005
Calcium	18.5	24.9	28.2	53.0
Calcium Hardness	138	179	202	235
Copper	<.020	<.020	<.020	<.020
Chromium	<.020	<.020	<.020	<.020
Iron	.974	<.100	<.100	1.09
Lead	.033	<.001	.002	.003
Magnesium	22.2	28.7	32.0	24.9
Manganese	<.030	<.030	<.030	.164
Selenium	<.001	<.001	<.001	<.001
Silver	<.020	<.020	<.020	<.020
Sodium	24.5	39.4	31.7	42.2
Zinc	.025	.046	<.010	<.010
Inorganics (in mg/L unless otherwise noted):				
Chloride	38	51	34	75
Color (Color Units)	10	<5.0	<5.0	40
Conductivity (umhos/cm)	370	520	520	620
Fluoride	.11	<.10	<.10	.24
Nitrite/Nitrate	3.3	7.6	15.0	.05
pH (lab)	7.9	7.7	7.4	7.8
Sulfate	8.9	31	37	38
Total Alkalinity	120	130	130	210
TDS	240	310	320	370
Turbidity (NTUs)	9.4	<.21	.25	.21
Radiological (in picocuries/L):				
Gross Alpha and Gross Beta particle emissions - data to be forwarded.				
Tritium	<530	<560	<510	<540
Pesticides/Herbicides (in ug/L):				
HCB	<.80	<.80	<.80	<.80
Alpha-BHC	<.20	<.20	<.20	<.20
Beta-BHC	<.20	<.20	<.20	<.20
Delta-BHC	<.20	<.20	<.20	.20
Lindane	<.08	<.08	<.08	.08
O,P'-DDD	<.40	<.40	.40	.40
P,P'-DDD	<.40	<.40	.40	.40
O,P'-DDE	<.40	.40	.40	.40
P,P'-DDE	<.40	<.40	.40	<.40
O,P'-DDT	<.60	<.60	<.60	<.60
P,P'-DDT	<.60	<.60	<.60	<.60
Aldrin	<.16	<.16	<.16	<.16
Dieldrin	<.24	<.24	<.24	<.24
Endrin	<.04	<.04	<.04	<.04
Endrin Aldehyde	<1.0	<1.0	<1.0	<1.0
Chlordane	<1.2	<1.2	<1.2	<1.2
	6 Oct 88 1005	6 Oct 88 1015	6 Oct 88 1035	6 Oct 88 1053

Station	17	18	19	20
Analyte	(North) Dutch Windmill	S.F. Zoo	Stern Grove	Pine Lake
Chlordane metab.	<1.2	<1.2	<1.2	<1.2
Trans-Chlordane	<.16	<.16	<.16	<.16
Cis-Chlordane	<.16	<.16	<.16	<.16
Oxychlordane	<.16	<.16	<.16	<.16
Endosulfan I	<.60	<.60	<.60	<.60
Endosulfan II	<.60	<.60	<.60	<.60
Endosulfan Sulfate	<.60	<.60	<.60	<.60
Heptachlor	<.08	<.08	<.08	<.08
Heptachlor Epoxide	<.16	<.16	<.16	<.16
Methoxychlor	<1.6	<1.6	<1.6	<1.6
Mirex	<.40	<.40	<.40	<.40
Toxaphene	<1.6	<1.6	<1.6	<1.6
PCB (Aroclor 1242)	<.80	<.80	<.80	<.80
PCB (Aroclor 1248)	<.80	<.80	<.80	<.80
PCB (Aroclor 1254)	<.80	<.80	<.80	<.80
PCB (Aroclor 1260)	<.80	<.80	<.80	<.80
Diazinon	<1.0	<1.0	<1.0	<1.0
Methyl Parathion	<.60	<.60	<.60	<.60
Parathion	<.40	<.40	<.40	<.40
Malathion	<1.6	<1.6	<1.6	<1.6
Chlorpyrifos	<.24	<.24	<.24	<.24
Ronnel	<.20	<.20	<.20	<.20

Station	21	22	23	24
Analyte	S.F. State Well	S.F.-Hensil Hall. 5th Flr	Olympic Club	Home Laundry w/softener
	WELL	CITY WATER	WELL	WELL
Metals (in mg/L):				
Arsenic	<.001	.001	<.001	<.001
Barium	.034	.015	.016	<.010
Cadmium	<.0005	<.0005	<.0005	.0008
Calcium	72.6	10.2	26.0	1.35
Calcium Hardness	249	39	189	8.15
Copper	<.020	<.020	<.020	<.020
Chromium	<.020	<.020	.028	<.020
Iron	<.100	<.100	<.100	<.100
Lead	<.001	.002	.002	.002
Magnesium	16.4	3.27	30.0	1.16
Manganese	<.030	<.030	<.030	<.030
Selenium	<.001	<.001	<.001	.002
Silver	<.020	.025	<.020	<.020
Sodium	56.2	7.91	41.4	213
Zinc	<.010	<.010	.176	.058
Inorganics (in mg/L unless otherwise noted):				
Chloride	37	7.2	68	73
Color (Color Units)	<5.0	<5.0	<5.0	<5.0
Conductivity (umhos/cm)	690	120	560	940
Fluoride	.27	1.0	<.10	<.10
Nitrite/Nitrate	11.0	<.05	5.4	15.0
pH (lab)	7.9	8.6	7.9	7.4
Sulfate	52	5.1	20	60
Total Alkalinity	240	38	140	270
TDS	440	66	320	620
Turbidity (NTUs)	<.21	<.21	<.21	.76
Radiological (in picocuries/L):				
Gross Alpha and Gross Beta particle emissions - data to be forwarded.				
Tritium	<510	<520	<510	<520
Pesticides/Herbicides (in ug/L):				
HCB	<.80	<.80	<.80	<.80
Alpha-BHC	<.20	<.20	<.20	<.20
Beta-BHC	<.20	<.20	<.20	<.20
Delta-BHC	<.20	<.20	<.20	<.20
Lindane	<.08	<.08	<.08	.08
O,P'-DDD	<.40	<.40	<.40	.40
P,P'-DDD	<.40	<.40	.40	.40
O,P'-DDE	<.40	<.40	.40	.40
P,P'-DDE	<.40	<.40	<.40	<.40
O,P'-DDT	<.60	<.60	<.60	<.60
P,P'-DDT	<.60	<.60	<.60	<.60
Aldrin	<.16	<.16	<.16	<.16
Dieldrin	<.24	<.24	<.24	<.24
Endrin	<.04	<.04	<.04	<.04
Endrin Aldehyde	<1.0	<1.0	<1.0	<1.0
Chlordane	<1.2	<1.2	<1.2	<1.2
	6 oct 88 1130	6 oct 88 1130	6 oct 88 1340	6 oct 88 1430

Station Analyte	21 S.F. State Well	22 S.F.-Hensil Hall. 5th Flr	23 Olympic Club	24 Home Laundry w/softener
Chlordane metab.	<1.2	<1.2	<1.2	<1.2
Trans-Chlordane	<.16	<.16	<.16	<.16
Cis-Chlordane	<.16	<.16	<.16	<.16
Oxychlordane	<.16	<.16	<.16	<.16
Endosulfan I	<.60	<.60	<.60	<.60
Endosulfan II	<.60	<.60	<.60	<.60
Endosulfan Sulfate	<.60	<.60	<.60	<.60
Heptachlor	<.08	<.08	<.08	<.08
Heptachlor Epoxide	<.16	<.16	<.16	<.16
Methoxychlor	<1.6	<1.6	<1.6	<1.6
Mirex	<.40	<.40	<.40	<.40
Toxaphene	<1.6	<1.6	<1.6	<1.6
PCB (Aroclor 1242)	<.80	<.80	<.80	<.80
PCB (Aroclor 1248)	<.80	<.80	<.80	<.80
PCB (Aroclor 1254)	<.80	<.80	<.80	<.80
PCB (Aroclor 1260)	<.80	<.80	<.80	<.80
Diazinon	<1.0	<1.0	<1.0	<1.0
Methyl Parathion	<.60	<.60	<.60	<.60
Parathion	<.40	<.40	<.40	<.40
Malathion	<1.6	<1.6	<1.6	<1.6
Chlorpyrifos	<.24	<.24	<.24	<.24
Ronnel	<.20	<.20	<.20	<.20

Station	25 PSF, Water Plant Clearwell RESERVOIR	26 Main Reservoir RESERVIOR	27 UN Plaza SUMP	28 Laguna Honda Reservoir LAKE
Analyte				
Metals (in mg/L):				
Arsenic	<.001	<.001	.001	.001
Barium	.013	.071	.033	.034
Cadmium	<.0005	<.0005	<.0005	<.0005
Calcium	29.8	29.7	51.8	11.7
Calcium Hardness	237	236	267	42.6
Copper	<.020	<.020	<.020	<.020
Chromium	<.020	<.020	<.020	<.020
Iron	<.100	.162	<.100	.210
Lead	.005	.059	.009	.007
Magnesium	39.4	39.3	33.3	3.25
Manganese	<.030	<.030	.064	.115
Selenium	<.001	<.001	<.001	<.001
Silver	<.020	<.020	<.020	<.020
Sodium	35.4	34.9	37.3	5.52
Zinc	.019	.226	.063	.026
Inorganics (in mg/L unless otherwise noted):				
Chloride	45	46	45	8.6
Color (Color Units)	<5.0	<5.0	<5.0	50
Conductivity (umhos/cm)	620	600	690	110
Fluoride	<.10	.10	.18	1.0
Nitrite/Nitrate	9.3	9.3	10.0	.09
pH (lab)	7.8	7.8	7.3	7.3
Sulfate	47	42	44	5.3
Total Alkalinity	170	170	190	33
TDS	350	350	410	67
Turbidity (NTUs)	.31	.42	.26	23.0
Radiological (in picocuries/L):				
Gross Alpha and Gross Beta particle emissions - data to be forwarded.				
Tritium	<520	<500	<510	<490
Pesticides/Herbicides (in ug/L):				
HCB	<.80	<.80	<.80	<.80
Alpha-BHC	<.20	<.20	<.20	<.20
Beta-BHC	<.20	<.20	<.20	<.20
Delta-BHC	<.20	<.20	<.20	.20
Lindane	<.08	<.08	<.08	.08
O,P'-DDD	<.40	<.40	.40	.40
P,P'-DDD	<.40	.40	<.40	<.40
O,P'-DDE	.40	<.40	<.40	<.40
P,P'-DDE	<.40	.40	<.40	<.40
O,P'-DDT	<.60	<.60	<.60	<.60
P,P'-DDT	<.60	<.60	<.60	<.60
Aldrin	<.16	<.16	<.16	<.16
Dieldrin	<.24	<.24	<.24	<.24
Endrin	<.04	<.04	<.04	<.04
Endrin Aldehyde	<1.0	<1.0	<1.0	<1.0
Chlordane	<1.2	<1.2	<1.2	<1.2
	6 Oct 88 1500	6 Oct 88 1530	7 Oct 88 1030	7 Oct 88 1230

Station Analyte	25 PSF Water Plant Clearwell	26 PSF, Main Reservoir	27 U.N. Plaza	28 Lagunda Honda Reservoir
Chlordane metab.	<1.2	<1.2	<1.2	<1.2
Trans-Chlordane	<.16	<.16	<.16	<.16
Cis-Chlordane	<.16	<.16	<.16	<.16
Oxychlordane	<.16	<.16	<.16	<.16
Endosulfan I	<.60	<.60	<.60	<.60
Endosulfan II	<.60	<.60	<.60	<.60
Endosulfan Sulfate	<.60	<.60	<.60	<.60
Heptachlor	<.08	<.08	<.08	<.08
Heptachlor Epoxide	<.16	<.16	<.16	<.16
Methoxychlor	<1.6	<1.6	<1.6	<1.6
Mirex	<.40	<.40	<.40	<.40
Toxaphene	<1.6	<1.6	<1.6	<1.6
PCB (Aroclor 1242)	<.80	<.80	<.80	<.80
PCB (Aroclor 1248)	<.80	<.80	<.80	<.80
PCB (Aroclor 1254)	<.80	<.80	<.80	<.80
PCB (Aroclor 1260)	<.80	<.80	<.80	<.80
Diazinon	<1.0	<1.0	<1.0	<1.0
Methyl Parathion	<.60	<.60	<.60	<.60
Parathion	<.40	<.40	<.40	<.40
Malathion	<1.6	<1.6	<1.6	<1.6
Chlorpyrifos	<.24	<.24	<.24	<.24
Ronnel	<.20	<.20	<.20	<.20

6 Dec 88

Primary + Secondary EPA Standards

EPA Certified Lab CA Certified Lab

Commander
Presidio of San Francisco
LAMC
ATTN: PVNTMED Svc
Presidio of San Francisco, CA 94129-6700

Tom:

Attached is the data from your sampling effort on 4-7 Oct 88. The Tritium data is included; however, the data depicting Gross Alpha and Gross Beta emissions are being re-analyzed due to some quality assurance problems. These results will be forwarded as soon as possible. I haven't tried to correlate anything for you, since I don't know exactly what your objectives are. However, if you wish such assistance while assessing these results, please give me a call.

I got to thinking about you wanting to use this data for your annual analysis for regulatory compliance, and I'm not sure that would be a good idea. While you do have a sample point at the entry point to the distribution system, most chemical analyses for regulatory purposes must be obtained from within the active distribution system. It would be good if this information could fulfill that need as well, but I don't think it would meet the requisite criteria. Such analyses are the responsibility of the DEH, and should be accomplished by them (via contract, etc.) on an annual basis.

Thomas R. Runyon
Environmental Engineer
USAEHA, Water Quality
Engineering Division

APPENDIX K:

HAZARDOUS MATERIALS INVENTORIES

HAZARDS PRESENT IN DIFFERENT AREAS CONCERNING LAMC

ROOM_NUMBER	LOCATION_CD	OPR_CODE	HAZARD
X-RAY (217)	RD	XRY	ACETIC ACID
VET LAB	RV	BIO	BORIC ACID
VET LAB	RV	BIO	SODIUM DICHROMATE
VET LAB	RV	BIO	RESORCINOL
VET LAB	RV	BIO	TOLUENE (TOLUOL)
VET LAB	RV	BIO	2-BUTOXYETHANOL (BUTYL CELLOSOLVE)
VET LAB	RV	BIO	AMMONIUM CHLORIDE FUME
VET LAB	RV	BIO	HYDROQUINONE
VET LAB	RV	BIO	CALCIUM OXIDE
VET LAB	RV	BIO	POTASSIUM HYDROXIDE
VET LAB	RV	BIO	ARSENIC TRIOXIDE
VET LAB	RV	BIO	AMMONIUM HYDROXIDE
VET LAB	RV	BIO	HEPTANE (N-HEPTANE)
VET LAB	RV	BIO	SODIUM AZIDE
VET LAB	RV	BIO	LEAD ACETATE
VET LAB	RV	BIO	HYDRAZINE
VET LAB	RV	BIO	PHOSPHOTUNGSTIC ACID
VET LAB	RV	BIO	HYDROXYLAMINE HYDROCHLORIDE
VET LAB	RV	BIO	CARBON TETRACHLORIDE
VET LAB	RV	BIO	AMMONIUM ACETATE
VET LAB	RV	BIO	ACETIC ACID
VET LAB	RV	BIO	AMMONIUM NITRATE
VET LAB	RV	BIO	ISOPROPYL ALCOHOL
VET LAB	RV	BIO	ACETONE
VET LAB	RV	BIO	CHLOROFORM
VET LAB	RV	BIO	DIMETHYL FORMAMIDE
VET LAB	RV	BIO	PROPYL ALCOHOL
VET LAB	RV	BIO	BUTYL ALCOHOL
VET LAB	RV	BIO	BENZENE
VET LAB	RV	BIO	MERCURY (AS INORGANIC HG)
VET LAB	RV	BIO	GRAPHITE, NATURAL (CARBON)
VET LAB	RV	BIO	COPPER (DUSTS, MISTS AND FUMES)
VET LAB	RV	BIO	BISMUTH
VET LAB	RV	BIO	MERCURY CHLORIDE
VET LAB	RV	BIO	ACETONITRILE
VET LAB	RV	BIO	CARBON DISULFIDE
VET LAB	RV	BIO	IODINE
VET LAB	RV	BIO	PHOSPHORIC ACID
VET LAB	RV	BIO	DIMETHYL SULFATE
VET LAB	RV	BIO	FERROUS SULFATE
VET LAB	RV	BIO	POTASSIUM NITRATE
VET LAB	RV	BIO	SODIUM SULFITE
VET LAB	RV	BIO	SODIUM THIOSULFATE
VET LAB	RV	BIO	CALCIUM HYPOCHLORITE
VET LAB	RV	BIO	AMMONIUM SULFATE
VET LAB	RV	BIO	PHTHALIC ANHYDRIDE

UPDATED AS OF DECEMBER 1988

HAZARDS PRESENT IN DIFFERENT AREAS CONCERNING LAMC

ROOM_NUMBER	LOCATION_CD	OPR_CODE	HAZARD
VET LAB	RV	BIO	BENZIDINE
REFE CHEM	LA	CMA	FORMALDEHYDE
PATHOLOGY	LA	CMA	ALUMINUM SULFATE
PATHOLOGY	LA	CMA	4,4'-METHYLENE BIS (2-CHLOROANILINE)
PATHOLOGY	LA	CMA	ETHYLENE DICHLORIDE
PATHOLOGY	LA	CMA	METHYL ISOBUTYL KETONE (HEXONE)
PATHOLOGY	LA	CMA	ACETIC ANHYDRIDE
PATHOLOGY	LA	CMA	TOLUENE (TOLUOL)
PATHOLOGY	LA	CMA	DIETHYLAMINE
PATHOLOGY	LA	CMA	N-HEXANE
PATHOLOGY	LA	CMA	AMMONIUM CHLORIDE FUME
PATHOLOGY	LA	CMA	POTASSIUM HYDROXIDE
PATHOLOGY	LA	CMA	SODIUM HYDROXIDE
PATHOLOGY	LA	CMA	XYLENE (O-, M-, P-ISOMERS)
PATHOLOGY	LA	CMA	AMMONIUM HYDROXIDE
PATHOLOGY	LA	CMA	ETHYL ACETATE
PATHOLOGY	LA	CMA	HEPTANE (N-HEPTANE)
PATHOLOGY	LA	CMA	FORMALDEHYDE
PATHOLOGY	LA	CMA	CARBON TETRACHLORIDE
PATHOLOGY	LA	CMA	ETHYL ETHER
PATHOLOGY	LA	CMA	ETHYL ALCOHOL
PATHOLOGY	LA	CMA	ACETIC ACID
PATHOLOGY	LA	CMA	METHYL ALCOHOL (METHANOL)
PATHOLOGY	LA	CMA	ISOPROPYL ALCOHOL
PATHOLOGY	LA	CMA	ACETONE
PATHOLOGY	LA	CMA	CHLOROFORM
PATHOLOGY	LA	CMA	METHYL SULFOXIDE (DMSO)
PATHOLOGY	LA	CMA	PROPYL ALCOHOL
PATHOLOGY	LA	CMA	BUTYL ALCOHOL
PATHOLOGY	LA	CMA	ACETONITRILE
PATHOLOGY	LA	CMA	ETHYL MERCAPTAN
PATHOLOGY	LA	CMA	METHYLENE CHLORIDE
PATHOLOGY	LA	CMA	SODIUM NITRITE
PATHOLOGY	LA	CMA	HYDROCHLORIC ACID (HYDROGEN CHLORIDE)
PATHOLOGY	LA	CMA	PHOSPHORIC ACID
PATHOLOGY	LA	CMA	SULFURIC ACID
PATHOLOGY	LA	CMA	NITRIC ACID
PATHOLOGY	LA	CMA	FERRIC CHLORIDE
PATHOLOGY	LA	CMA	FERROUS SULFATE
PATHOLOGY	LA	CMA	POTASSIUM PERMANGANATE
PATHOLOGY	LA	CMA	HYDROGEN PEROXIDE (90%)
PATHOLOGY	LA	CMA	BROMINE
PATHOLOGY	LA	CMA	CHROMIC ACID (CR VI)
PATHOLOGY	LA	CMA	COPPER SULFATE
PATHOLOGY	LA	CMA	SILVER NITRATE
PATHOLOGY	LA	CMA	PETROLEUM SPIRITS (MINERAL SPIRITS)

UPDATED AS OF DECEMBER 1988

HAZARDS PRESENT IN DIFFERENT AREAS CONCERNING LAMC

ROOM_NUMBER	LOCATION_CD	OPR_CODE	HAZARD
PATHOLOGY	LA	CMA	4-NITRODIPHENYL
OPER RM	OR	OPN	NITRIC OXIDE
OPER RM	OR	OPN	ETHRANE
OPER RM	OR	OPN	HALOTHANE
N/A	FS	FDP	NOISE,CONTINUOS
HOUSE-KPG	HK	MAI	2-BUTOXYETHANOL (BUTYL CELLOSOLVE)
HOUSE-KPG	HK	MAI	POTASSIUM HYDROXIDE
HOUSE-KPG	HK	MAI	ETHANOLAMINE
HOUSE-KPG	HK	MAI	METHYL CHLOROFORM
HOUSE-KPG	HK	MAI	PHOSPHORIC ACID
HOUSE-KPG	HK	MAI	STODDARD SOLVENT
HEMA-BB	LA	BIO	ETHYL ALCOHOL
HEMA-BB	LA	BIO	ISOPROPYL ALCOHOL
DENTAL	DO	GDC	ACETIC ANHYDRIDE
DENTAL	DO	GDC	PHENOL
DENTAL	DO	GDC	OXALIC ACID
DENTAL	DO	GDC	FORMALDEHYDE
DENTAL	DO	GDC	FORMIC ACID
DENTAL	DO	GDC	ACETIC ACID
DENTAL	DO	GDC	ISOPROPYL ALCOHOL
DENTAL	DO	GDC	ACETONE
DENTAL	DO	GDC	CHLOROFORM
DENTAL	DO	GDC	ACETALDEHYDE
DENTAL	DO	GDC	IODINE
DENTAL	DO	GDC	PERCHLORIC ACID
DENTAL	DO	GDC	HYDROCHLORIC ACID (HYDROGEN CHLORIDE)
DENTAL	DO	GDC	PHOSPHORIC ACID
DENTAL	DO	GDC	NITRIC ACID
CMS	OT	OTH	ETHYLENE OXIDE
CLIN INV	LA	BIO	ACETIC ANHYDRIDE
CLIN INV	LA	BIO	TOLUENE (TOLUOL)
CLIN INV	LA	BIO	PHENOL
CLIN INV	LA	BIO	2-METHOXYETHANOL (METHYL CELLOSOLVE)
CLIN INV	LA	BIO	DIETHYLAMINE
CLIN INV	LA	BIO	TETRAHYDROFURAN
CLIN INV	LA	BIO	2-ETHOXYETHANOL (CELLOSOLVE)
CLIN INV	LA	BIO	PYRIDINE
CLIN INV	LA	BIO	TRIETHYLAMINE
CLIN INV	LA	BIO	ETHIDIUM BROMIDE
CLIN INV	LA	BIO	POTASSIUM HYDROXIDE
CLIN INV	LA	BIO	SODIUM HYDROXIDE

UPDATED AS OF DECEMBER 1988

HAZARDS PRESENT IN DIFFERENT AREAS CONCERNING LAMC

ROOM_NUMBER	LOCATION_CD	OPR_CODE	HAZARD
CLIN INV	LA	BIO	XYLENE (O-, M-, P-ISOMERS)
CLIN INV	LA	BIO	ETHYL ACETATE
CLIN INV	LA	BIO	SODIUM AZIDE
CLIN INV	LA	BIO	CARBON TETRACHLORIDE
CLIN INV	LA	BIO	ETHYLENE GLYCOL DINITRATE
CLIN INV	LA	BIO	ACETIC ACID
CLIN INV	LA	BIO	METHYL ALCOHOL (METHANOL)
CLIN INV	LA	BIO	ACETONE
CLIN INV	LA	BIO	CHLOROFORM
CLIN INV	LA	BIO	BUTYL ALCOHOL
CLIN INV	LA	BIO	BENZENE
CLIN INV	LA	BIO	ACETONITRILE
CLIN INV	LA	BIO	CARBON DISULFIDE
CLIN INV	LA	BIO	PERCHLORIC ACID
CLIN INV	LA	BIO	HYDROCHLORIC ACID (HYDROGEN CHLORIDE)
CLIN INV	LA	BIO	PHOSPHORIC ACID
CLIN INV	LA	BIO	SULFURIC ACID
CLIN INV	LA	BIO	NITRIC ACID
CLIN INV	LA	BIO	PROPIONIC ACID (DALAPON)
CLIN CHEM	LA	CMA	FORMALDEHYDE
6-ICU	PC	GHC	XYLENE (O-, M-. P-ISOMERS)
6-ICU	PC	GHC	DICHLOROTETRAFLUOROETHANE
5 NEW/NURS	PC	GHC	ISOPROPYL ALCOHOL
5 NEW/NURS	PC	GHC	HYDROGEN PEROXIDE (90%)
202	HL	PAT	NITROGEN OXIDES
202	HL	PAT	BORIC ACID
202	HL	PAT	ETHYLENE GLYCOL, VAPOR
202	HL	PAT	XYLENE (O-, M-, P-ISOMERS)
202	HL	PAT	ACETIC ACID
202	HL	PAT	FORMAMIDE
202	HL	PAT	SULFURIC ACID
10-EAST	PC	OTH	HTLV-AIDS VIRUS

UPDATED AS OF DECEMBER 1988

LIST OF CHEMICALS USED IN THE PATHOLOGY DEPARTMENT, NOT PRESENT IN THE HAZARD MASTER FILE.

MATERIAL	LAB ITEM	CAS CODE
Auramine O	Auramine O stain	2465-27-2
Barium Hydroxide Octahydrate		17194-00-2
Chromic Acid, Solid		1333-82-0
Formaldehyde	Coulter Lysing Kits	500-00-0
Methyl Alcohol (Methanol)		675-56-1
Methylamine Hydrochloride		593-51-1
Sodium Chloride	Saline Solution	7647-14-5
Sodium Hydroxide		1310-73-2
Tris-Dimethyl-Phenol		26444-72-4
Trisodium Phosphate Hydrate	NA Phosphate, Tribasic	7601-54-9
Zinc Metal Powder		7440-66-6

UPDATED AS OF DECEMBER 1988

HAZARDOUS MATERIALS IN DIFFERENT AREAS IN LAMC

AREA	HAZARDOUS MATERIAL
WARD 10 WEST	BLOOD CULTURE BOTTLES BLEACH A-500 CLEANING SOLUTION
WARD 10 EAST	BLEACH (CLOROX) BLOOD CULTURE BOTTLES NEUTRAL FORMALIN SOLUTION
WARD 9 EAST	BLOOD CULTURE BOTTLES
WARD 9 WEST	A-500 CLEANING SOLUTION BLOOD CULTURE BOTTLES
WARD 8 EAST	NO HAZARDOUS MATERIAL
WARD 5 WEST	NO HAZARDOUS MATERIAL
WARD 4 EAST	BLOOD CULTURE BOTTLES CHEMOTHERAPEUTIC DRUGS (LIST UNAVAILABLE) BLEACH
ENT CLINIC	NO HAZARDOUS MATERIAL
SAETC CLINIC	NO HAZARDOUS MATERIAL
HEMODIALYSIS UNIT	BLEACH (CLOROX) 10% FORMALIN SOLUTION
CAST ROOM	NO HAZARDOUS MATERIAL
ORTHOPAEDIC SURGERY SERVICE	NO HAZARDOUS MATERIAL

UPDATED AS OF DECEMBER 1988

HAZARDOUS MATERIAL INVENTORY VETERINARY LAB.

Aluminum Potassium Sulfate Decahydrate
Charcoal
Magnesium
Sodium Chloride
Molybdenum Trioxide
Sodium Molybdate
Sodium Diethyldithiocarbamate
Salicylic Acid
Potassium Phosphate Monobasic

Calcium Sulfate
Dichloromethane
Phenolphtalein
Soda Lime
Sodium Acetate
Sodium Tungsten
Sodium Phosphate
Silver Sulfate
Potassium Iodide

Acetyl Chloride
Ammonium Phosphate Monobasic
Ammonium Oxalate, Monohydrate
Cobalt Nitrate, 6-Hydrate
4,5, Dihydroxy-2-7-naphtalene Disulfonic Acid
2,3, Butanedione Monoxine
D-(+)- Lactose Monohydrate
Lead Sub-Acetate
L(+)-Glutamic Acid
Methyl Orange, Sodium Salt
Methyl Violet 2B
Potassium Biphthalate
Potassium Sodium Tartarate
Potassium Phosphate Monobasic
N-1 Naphthylethylenediamine Dihydrochloride
Silica Gel Dessicant
Phloroglucinol Dihydrate
Stannous Chloride
Lead Sub-Acetate, Powder
2-Thiobarbituric Acid
Silver Diethyldithiocarbamate
Sodium Bromate, 10-Hydrate
Ferric Sulfate
Sodium Sulfide
Potassium Ferrocyanide
Sublimed Sulfite

Atimony Trichloride
Basic Fuchsin
Cupric Nitrate
Cupric Sulfate
Ether
Dimethylsulfoxide
Lanthanum Oxide
Mercuric Iodide
Manganese Dioxide
Meta-Phosphoric Acid
Potassium Chloride
Potassium Bromate
Potassium Persulfate
Sodium Carbonate
Sodium Acetate
Sodium Citrate
Sodium Molybdate
4-Aminoantipyrine
1,4-Dioxane
Zinc Mossy
Quinoline
Silver Nitrate
Sodium Tartrate
Potassium Bisulfate
Sublimed Sulfur

Ammonium Carbonate
Bromthymol Blue
B-Lactoglobulin A
B-Lactoglobulin A&B
CIS-Linoleic Acid (Crude)
CIS-Linoleic Acid (Methyl Ester)
Dalmitoleic Acid
Didasylcadaverine
Histamine, Dihydrochloride
Linoleic Acid (9,12,15-Octadecatrienoic Acid)
Monodansylcadaverine
Myristic Acid Ester
n-Valeric Acid
Pararosaniline Hydrochloride
Putrescinc
Sulfanilic Acid
Arachide Acid Methyl Ester
1,2-Diolein

Arachidic Acid
Bouine Serum Albumin
B-Lactoglobulin B
Cadaverine
Coumarine
Dansyl Chloride
Didasylhistamine
Lauryl Sulfate
Lipid Stands
Momoolein
Myristic Acid
a-Monopalmitin
Oleic Acid
P-Nitroanailine
Pyrazinamide
Triton
Vanillin
1,3-Diolein

Antimony-Potassium Tartrate
Absorptive Magnesia
[illegible]

L-Ascorbic Acid
Barium Hydroxide
[illegible]

SCI

SERVICE CONTRACTORS, INC.

"TOTAL PROPERTY SERVICES"

8201 CORPORATE DRIVE, SUITE 600, LANDOVER, MARYLAND 20785
WASHINGTON AREA (301) 459-3200
BALTIMORE AREA (301) 792-9468

Product Listing

Department of Housekeeping

Letterman Army Medical Center

Kindest Kare Lotion skin Cleaner	TAB A
BC-750 Bowl Cleaner	TAB B
Pop It Chewing Gum Remover	TAB C
GULP-IT	TAB D
SP-255 Stainless Steel Cleaner Polish	TAB E
Shiney Stainless Steel Cleaner Polish	TAB F
High Sparkle Glass Cleaner	TAB G
FP-575 Heavy Duty High Solids Metal Interlock Floor Finish	TAB H
3M Brand 303 Dri Strip	TAB I
ST-232 Super Strip	TAB J
AJAX	TAB K
SE-450 Carpet Steam Extractor Concentrate	TAB L
SB-140 Spray Buff Ready To Use	TAB M
Compare Heavy Duty High Solids Metal Interlock Floor Finish	TAB N
CB 505 COMEBACK Floor polish restorer	TAB O
715 SURTECIDE EQ	TAB P
SC-210 Super clean (Formula now Butyl Degreaser)	TAB Q
High Power Heavy Duty Cleaner-Degreaser-Stripper	TAB R

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL	SUBJECT
HSHH-NUR	Areas Using Cidex

TO Environmental Science Officer FROM Infection Control Nurse DATE 6 Dec 88 CMT 1

LTC Waxdahl/tan/3547

As requested, the following is a list of areas in Department of Nursing that use Cidex and their estimated use amounts per quarter. CMS is not included as you are already aware of their use.

Area	Use per quarter (gallons)
Operating Room	30-36
Anesthesia	8
Internal Medicine Clinic	3
Allergy/Immunology Clinic	12
Emergency Room	3
Gastro/Endoscopy Clinic	12
Gyn Clinic	1
Oral Surgery	1-2
Surgical Clinic	6
Urology Clinic	72
Walk-In Clinic	3

Karen A. Waxdahl

KAREN A. WAXDAHL
LTC, AN
Infection Control Nurse

CF: C, Dept of Nursing

DIFFERENT AREAS IN LAMC THAT USE CIDEX

AREA	USE PER QUARTER YEAR (GAL.)
OPERATING ROOM	30-36
ANESTHESIA	8
INTERNAL MEDICINE CLINIC	3
ALLERGY/IMMUNOLOGY CLINIC	12
EMERGENCY ROOM	3
GASTRO/ENDOSCOPY CLINIC	12
GYN CLINIC	1
ORAL SURGERY	1-2
SURGICAL CLINIC	6
UROLOGY CLINIC	72
WALK-IN CLINIC	3
CMS	25-30

UPDATED AS OF DECEMBER 1988

THE FOLLOWING IS A LIST OF SEVERAL FLAMMABLE ITEMS STORED IN THE MATERIEL BRANCH. POC IS SSG GATLING AT 561-5953 (THE CAS CODES OF THE ITEMS WERE NOT AVAILABLE AT THIS TIME).

ITEM

RESIN
CARTRIDGE GAS (NON-SPECIFIC)
PROPANE
XYLENE
SODIUM
RESIN (NON-SPECIFIC)
LUBRICANT (NON-SPECIFIC)
SEPARATING FLUID
CLEANER (DIFFERENT TYPES)
CASTING FLUID
ERYTHROMYCIN
TINCTURE COMPOUND
TRIOMCINOLONE
ALCOHOL (DIFFERENT TYPES, NON-SPECIFIC)
BONE CEMENT
ETHER
COLLODIUM
SILVER NITRATE
ACID BUFFER
METHANOL
ACETONE
SODA LIME

THIS LIST IS UPDATED AS OF APRIL 1989

THE FOLLOWING ITEMS ARE LISTED AS STORED IN THE ACID SHED OF TH
MATERIAL BRANCH. POC IS SSG GATLING AT 561-5953.

ITEM

SODA LIME
ORABIC ACID
POTASSIUM
LIQUID STARTER
ACID (NON-SPECIFIC)
ACETIC ACID
X-RAY FIXER
FIXER, REPLENISHER
DEVELOPER (NON-SPECIFIC)
X-MAT REPLENISHER
FIXER (NON-SPECIFIC)
FIXER, REPLENISHER
DEVELOPER, REPLENISHER
FIXER, X-RAY

THE AMOUNT OF THESE ITEMS WAS UNKNOWN AT THE TIME THIS REPORT WAS MADE

UPDATED AS OF APRIL 1989.

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL
HSHH-NUR

SUBJECT
Areas Using Cidex

TO Environmental Science Officer

FROM Infection Control Nurse

DATE 6 Dec 88

CMT 1

LTC Waxdahl/tan/3547

As requested, the following is a list of areas in Department of Nursing that use Cidex and their estimated use amounts per quarter. CMS is not included as you are already aware of their use.

Area	Use per quarter (gallons)
Operating Room	30-36
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Internal Medicine Clinic	3
Allergy/Immunology Clinic	12
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Gastro/Endoscopy Clinic	12
Gyn Clinic	1
Oral Surgery	1-2
Surgical Clinic	6
Urology Clinic	72
Walk-In Clinic	3

Karen A. Waxdahl

KAREN A. WAXDAHL
LTC, AN
Infection Control Nurse

CF: ""C, Dept of Nursing

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL	SUBJECT
HSHH-MB-LOG	Listing of Acid Supplies

TO	FROM	DATE	CMT 1
Capt Little Preventive Medicine BLDG 1801 PSF, Ca. 94129	SSG Gatling NCOIC, Med Br. PSF, Ca. 94129	27 Jan 89 SSG Gatling/5953/tlg	

The following listing is an account of supplies stored in the Acid Shed of the Materiel Br.

6505-00-782-6484---------Soda Lime
6810-00-132-4020----------Orabic Acid
6810-00-136-6000----------Potassium
6525-01-152-3604----------Liquid Starter
6810-00-753-4785----------Acid
6505-00-100-2470----------Acetic Acid
6525-01-080-8762----------X-Ray Fixer
6525-01-075-8325----------Fixer, Repleniser
6525-01-128-3025----------Developer
6525-01-186-3192----------X-Mat Repleniser
6525-00-975-0612----------Fixer
6750-01-C19-0005----------Developer
6750-01-C19-0007----------FIxer/Repleniser
6525-01-C19-0089----------Developer/Repleniser
6525-01-098-5797----------Fixer X-Ray

POC at this office is SSG Gatling at 561-5953

Trenton Gatling
TRENTON L. GATLING
SSG, USA
NCOIC, MATERIEL BRANCH

DISPOSITION FORM

For use of this form, see AR 340-15; the proponent agency is TAGO.

REFERENCE OR OFFICE SYMBOL	SUBJECT
HSHH-MB-LOG	Listing of Flammable Items

TO	FROM	DATE	CMT 1
Capt Little Preventive Medicine Bldg 1801 PSF, Ca. 94129	SSG Gatling NCOIC, Mat Br. PSF, Ca. 94129	27 Jan 89 SSG Gatling/5953/tlg	

The following listing is an account of flammable items stored in the Materiel Branch flammable shed.

6520-00-420-5750---------Resin
6640-00-926-7674---------Cartridge Gas
6830-00-469-6540---------Propane
6810-00-753-4787---------Xylene
6810-00-148-7195---------Sodium
6520-01-020-1426---------Resin
6520-01-025-5021---------Resin
6520-00-145-0331---------Lubricant
6520-00-C96-4133---------Seperating Fluid
6520-00-457-6857---------Cleaner
6520-01-181-7011---------Casting Liquid
6505-01-118-6098---------Erythromycin
6505-00-261-7257---------Tincture Comp.
6520-00-889-9566---------Resin
6505-01-066-1325---------Triomcinolone
6505-00-149-1439---------Alcohol
6505-01-153-4240---------Alcohol
6640-00-935-6863---------Generator
6810-00-234-8370---------Sodium
6515-01-153-5275---------Bone Cement
6810-00-299-8501---------Ether
6550-00-139-1321---------Solution Hist.
6505-00-115-0000---------Collodium
6505-00-261-7256---------Alcohol USP
6505-00-299-9672---------Silver Nitrate
6630-01-070-2626---------Acid Buffer
6810-00-138-8414--------Xylenes 1 gal
6550-00-165-6538--------Test Kit Occult
6810-00-753-4783--------Methanol
6810-00-753-4780--------Acetone
6505-00-782-6484--------Soda Lime

POC is SSG Gatling at 561-5953.

Trenton Gatling
TRENTON L. GATLING
SSG, USA
NCOIC, MATERIEL BRANCH

DA FORM 2496 PREVIOUS EDITIONS WILL BE USED GPO : 1987 O - 177-428

DIRECTORATE/OFFICE Chemistry Branch of Blood Research Division DATE 22 Jun 89

HAZARDOUS MATERIAL INVENTORY

CHEMICAL NAME and/Generic Name)	MANUFACTURER	LOCATION (Bldg#/Room#)	MAXIMUM ON HAND	*FEDERAL STOCK NUMBER(FSN) NATIONAL STOCK NUMBER(NSN)	MSDS's ON FILE
Tetrahydrofuran anhydrous	Aldrich	LR2133	10 L	none	Equival.
Potassium Ferricyanide	Mallinckrodt	LR 2124	2 LBS	none	Equival
Sodium Cyanide	Fisher	LR2124	1 LB	none	Equival.
Sodium Metal Spheres	Aldrich	LR2133	100 GMS	none	Equival.
Mercury (II) Chloride	Aldrich	LR2133	100 GMS	none	Equival.
Benzene-d6	MSD Isotopes	LR2133	50 GMS	none	Equival
Chloroform-d	MSD Isotopes	LR2133	100 GMS	none	Equival
Hexane	Fisher	LR2134	4 L	none	Equival.
Benzene	Fisher	LR2134	4 L	none	Equival
Ethyl Acetate	Fisher	LR2134	4 L	none	Equival
Perchloric Acid	Baker	LR2134	1/2 L	none	Equival
Nitric Acid	Baker	LR2134	2 L	none	Equival
Sulfuric Acid	VWR	LR2134	10 L	none	Equival
Hydrochloric Acid	Baker	LR2134	3 L	none	Equival
Carbon Tetrachloride	Baker	LR2109	2 L	none	Equival
Toluene	Baker	LR2109	4 L	none	Equival
Chloroform	Mallinckrodt	LR2109	3 L	none	Equival.
Pyridostigmine-14C	New England Nuclear	LR2135	30mg, 69μC/mg	none	yes
2,2'-Dichloro-N-Methyl-Diethylamine·HCl(14C)	New England Nuclear	LR2135	11.43mC, 9.78μC/mmole,	none	yes
Polyethylene-1-2-14C-Glycol	New England Nuclear	LR2135	572.5mg, 0.25μC	none	yes
1-14C-Pyruvic Acid	Research Triangle Institute	LR2135	1.392μC/μL, 2[illegible]μL	none	yes
Succinic Anhydride-1,4-14C	Sigma	LR2135	50μC, 11.7mC/mmole	none	yes
Phenyldichloroarsine-14C	Chemsyn Science Laboratories	LR2135	5.4mC/mmole, 28mg	none	yes

DIRECTORATE/OFFICE OH, LR 2144 DATE 26 JUN 89

HAZARDOUS MATERIAL INVENTORY

CHEMICAL NAME rand/Generic Name)	MANUFACTURER	LOCATION (Bldg#/Room#)	MAXIMUM ON HAND	*FEDERAL STOCK NUMBER(FSN) NATIONAL STOCK NUMBER(NSN)	MSDS's ON FILE
27. Xylenes	Mallenckrodt	LR 2144	4L		
28. Sulfuric Acid	"		4L		
29. Nitric Acid	JT. Baker		10L		
30. Phosphoric Acid	Fisher	LR 2144	500 ml.		
31. Hydrochloric Acid	Aldrich		1L		
32. Acrylamide	Sigma		1kg.		
33. Trichloroacetic Acid	Aldrich		1kg		
34. Sodium Hydroxide	Aldrich		500g.		

DIRECTORATE/OFFICE LAIR - Division of Ocular Hazards DATE ________

HAZARDOUS MATERIAL INVENTORY

CHEMICAL NAME and/Generic Name)	MANUFACTURER	LOCATION (Bldg#/Room#)	MAXIMUM ON HAND	*FEDERAL STOCK NUMBER(FSN) NATIONAL STOCK NUMBER(NSN)	MSDS's ON FILE
Rust penetrating lubricant	Kano Penetrite Lab.	1110/LR 2183	1 doz 10 oz can		
Rust penetrating oil	Kano Laboratory	B1110/LR2183	" "		
Rust penetrating oil	" "	" "	" "	aerosols	
" " " (Molyfilm)	" "	" "	1 doz 10 oz. can		
" " " (Bearoyl)	" "	" "	1 doz 10 oz can		
" " " (Silikene)	" "	" "	1 doz 10 oz can		
" " " (Silikroil)	" "	" "	1/2 gallon can		
" " " (Lubricane)	" "	" "	1/2 gallon can		
" " " (Kroil)	" "	" "	1/4 gallon can		
" " " (Microil)	" "	" "	1 pint can		
. Acetone	Mallinckrodt	" "	1 pint bottle		
2. Methanol.	Polysciences, Inc.	" "	1 pint bottle		
3. Assorted Lacquer (Aerosol	So-sure Co.	" "	4-13 oz. can		
4. Acetone	Fisher Scientific Co.		1/2 gallon bottle		
5. Methanol	Eastman	B1110/LR2184	1 gallon		
6. DMSO	Kodak		4 pint		
17. Chloroform	Mallinckrodt		1 pint	650-753-4775	
18 Alcohol (Methanol)	Polysciences	B1110/LR 2178	1/2 pint		
19. Methanol	Eastman	B1110/LR 2188	1 gallon bottle		
20. Ethylene Glycol	J.T. Baker Chem. Co		1/2 gallon "		
21. Methylsulfoxide	Aldrich Chem. Co.	B1110/LR 2188	3 gallon "		
22. Ethylene Glycol	Aldrich Chem. Co.		1 gallon bottle		
23. Methanol					
24. Ethanol					
25. Isopropanol	Mallinckrodt	LR 2144	5L		
26. Acetic Acid	"	"	12L		

* APPLICABLE (KNOWN)

DIRECTORATE/OFFICE LAIR, Records Management Branch DATE 5 July 1989

HAZARDOUS MATERIAL INVENTORY

CHEMICAL NAME (Brand/Generic Name)	MANUFACTURER	LOCATION (Bldg#/Room#)	MAXIMUM ON HAND	*FEDERAL STOCK NUMBER(FSN) NATIONAL STOCK NUMBER(NSN)	MSDS's ON FILE
TONER, Konica	Konica	AS 2216	1 Box	N/A	

DIRECTORATE/OFFICE MEDICAL AUDIO VISUAL SERVICES LAIR DATE 07 JUL 89

HAZARDOUS MATERIAL INVENTORY

CHEMICAL NAME (Brand/Generic Name)	MANUFACTURER	LOCATION (Bldg#/Room#)	MAXIMUM ON HAND	*FEDERAL STOCK NUMBER(FSN) NATIONAL STOCK NUMBER(NSN)	MSDS'S ON FILE
E-6 BLEACH	EASTMAN KODAK COMPANY	LAIR AS2115	1x5 GAL		
E-6 STABILIZER	" " "	" "	4x5 GAL		
E-6 REVERSAL BATH	" " "	" "	1x5 GAL		
PAKOSOL	PAKO CORPORATION	LAIR AS2116	2x1 GAL		
COLOR FILM FIXER	EASTMAN KODAK COMPANY	" "	2x2.25 GAL		
LIQUID BLEACH	LABBCO	" "	2x1 GAL		
VIVIDOL FILM DEVELOPER	GAF CORPORATION	" "	6x1 GAL		
FIRST DEVELOPER REPLENISHER	EASTMAN KODAK COMPANY	" "	9x5 GAL		
ULTRA #2 FILM DEVELOPER PT A	HUNT CHEMICAL CORP.	LAIR AS2110	8x5 GAL		X
ULTRA #2 FILM DEVELOPER PT B	" " "	" "	8x5 GAL		X
KODALITH LIQUID DEVELOPER PT A	EASTMAN KODAK COMPANY	LAIR AS2117	1x2.5 GAL		X
KODALITH LIQUID DEVELOPER PT B	" " "	" "	1x2.5 GAL		X

DIRECTORATE/OFFICE MEDICAL AUDIO VISUAL SERVICES LAIR DATE 07 JUL 89

HAZARDOUS MATERIAL INVENTORY

CHEMICAL NAME Brand/Generic Name)	MANUFACTURER	LOCATION (Bldg#/Room#)	MAXIMUM ON HAND	*FEDERAL STOCK NUMBER(FSN) NATIONAL STOCK NUMBER(NSN)	MSDS's ON FIL
RA2000 FILM DEVELOPER	EASTMAN KODAK COMPANY	LAIR AS2105	28x2.5 GAL		X
ROYALPRINT ACTIVATOR	" " "	" "	4.5 GAL		
ROYALPRINT STOP BATH	" " "	" "	1.5 GAL		
ROYALPRINT FIXER	" " "	" "	7.5 GAL		
RAPID FIXER PART A	" " "	" "	10 GAL		
RAPID FIXER PART B	" " "	" "	15 GAL		
MICRODOL-X FILM DEVELOPER	" " "	LAIR AS2116	12 QTS		
HUNT STOP BATH	HUNT CHEMICAL COMPANY	" "	11 QTS		
HYPO CLEARING AGENT	EASTMAN KODAK "	" "	59x5 GAL		
FIXER SYSTEMS CLEANER	" " "	" "	21x2.5 GAL		X
DEVELOPER SYSTEMS CLEANER	" " "	" "	25x8 GAL		
DIRECT POSITIVE DEVELOPER	" " "	" "	5 QTS		
D-19 FILM DEVELOPER	" " "	" "	14x5GAL		X
PHOTO-FLO 2100	" " "	" "	1 GAL		
DK-50 FILM DEVELOPER	" " "	" "	9 GAL		
D-11 FILM DEVELOPER	" " "	" "	8 GAL		
DEKTOL PAPER DEVELOPER	" " "	" "	20x.5 GAL		
D-76 FILM DEVELOPER	" " "	" "	4 GAL		
HC-110 FILM DEVELOPER	" " "	" "	6x1 GAL		
HC-110 FILM DEVELOPER REPLEN.	" " "	" "	10x1 GAL		
FR FINE GRAIN DEVELOPER	FR CORPORATION	" "	28x16oz		
E-6 FIRST DEVELOPER	EASTMAN KODAK COMPANY	LAIR AS2115	2x5 GAL		
E-6 COLOR DEVELOPER PART A	" " "	" "	2x5 GAL		
E-6 COLOR DEVELOPER PART B	" " "	" "	2x5 GAL		
E-6 CONDITIONER	" " "	" "	2x5 GAL		
E-6 FIXER	" " "	" "	3x5 GAL		

HSHH-PM 23 January 89

SUBJECT: MEMORANDUM FOR RECORD

1. Hazardous waste generated at Letterman Army Medical Center and PSF was removed by contracting personnel during the period of 6 to 23 January 89 for appropriate destruction procedures.

2. POC for this action is the undersigned.

Thomas J. Little
THOMAS J. LITTLE
CPT, MS
ESO

HAZARDOUS WASTE CHEMICALS INVENTORY FORM

OFFICE SYMBOL: HSHH-RVL
POINT OF CONTACT: Mr. Watson
TELEPHONE NUMBER: 561-4614

BUILDING: 1110
ROOM: LR-1161

CHEMICAL NAME (DO NOT ABBREVIATE)	CONTAINER			CHEMICAL			DOT HAZARD CLASS (2)
	QUANTITY	SIZE	TYPE	QUANTITY	UNIT	L OR S (1)	
Petroleum Ether	1	4-liter	bottle	2 liters		/	Fammable liquid
Ethyl Ether, Petroleum Ether, Water	1	5-gal	can	4 gallons		/	Fahmable liquid
Nitric Acid, Water	3	4-liter	bottle	11 liters		/	Corrasive material
Ether, Hexane, Methylene, Water, Food Sample Acetonitrile	3	4-liter	bottle	12 liters		/	Fammable liquid

HAZARDOUS WASTE CHEMICALS INVENTORY FORM

JANUARY 89

PAGE 1 OF 1

Dept. Nursing

OFFICE SYMBOL: HSHH-NUR-CMS, ~~Evitt~~ In Center Mat'l Service
POINT OF CONTACT: MAJ FOSS
TELEPHONE NUMBER: 5820

BUILDING: 1100
ROOM: 15

CHEMICAL NAME (DO NOT ABBREVIATE)	CONTAINER			CHEMICAL			DOT HAZARD CLASS (2)
	QUANTITY	SIZE	TYPE	QUANTITY	UNIT	L OR S (1)	
CIDEX, GLUTERARDEHYDE	29	Gallon	Plastic	29	Gallon	L ✓	

(DEH, ENCO, NOV 88) (1) L = LIQUID, S = SOLID (2) REF. DRAFT PSF REGULATION NO. 420-47 ENCL 1

HAZARDOUS WASTE CHEMICALS INVENTORY FORM

OFFICE SYMBOL: ~~ELAC~~ H-SHIL LAB-AP
POINT OF CONTACT: SSG Ramos
TELEPHONE NUMBER: 6219

BUILDING: 1100
ROOM: 200
2-28-38

CHEMICAL NAME (DO NOT ABBREVIATE)	CONTAINER QUANTITY	CONTAINER SIZE	CONTAINER TYPE	CHEMICAL QUANTITY	CHEMICAL UNIT	CHEMICAL L OR S(1)	DOT HAZARD CLASS(2)
Xylene/Formldehyde/Hemo-De/Alcohol	8	5 Galon		151,360	ml	✓	Flammable

(DEH, ECCO, NOV 88) (1) L = LIQUID, S = SOLID (2) REF. DRAFT PSF REGULATION NO. 420-47

ENCL 1

LAMC

HAZARDOUS WASTE CHEMICALS INVENTORY FORM

OFFICE SYMBOL: HSHH-LAB-CG
POINT OF CONTACT: SFC Govan
TELEPHONE NUMBER: X46200

BUILDING: 1100
ROOM: 202

CHEMICAL NAME (DO NOT ABBREVIATE)	CONTAINER QUANTITY	CONTAINER SIZE	CONTAINER TYPE	CHEMICAL QUANTITY	CHEMICAL UNIT	CHEMICAL L OR S(1)	DOT HAZARD CLASS (2)
ETHYL ACETATE	1	5 GAL	912 DRUM CAN	5050	ML	L ✓	FLAMMABLE
Hydrochloric Acid / Propanol	20	PINT	Bottle, Polyethylene Bt	20	PT	L /	Flammable Corrosive
ETHYL ETHER	2	LITER	Bottle, Polyethylene	2000	Ml	L ✓	FLAMMABLE

(DEH. EDCO. NOV 88) (1) L = LIQUID, S = SOLID (2) REF. DRAFT PSF REGULATION NO. 420-47

1801 R-60

DEPT. OF CLINICAL INVESTIGATION, LAMC

4

COMMERCIAL NAME	EPA NO./CA NO.	NSN	ID NO.	HAZARD CLASS.	QUANT.	CONTAINER
Acetone	U002/CA003	6505-00-616-7861	UN1090	flammable	22 liters	glass bottles
Acetone	U002/CA003	6505-00-616-7861	UN1090	flammable	8 liters	aluminum cans
Benzene		6810-00-753-4778	UN1114	flammable	5 liters	glass bottles
Butanol	CA137	6810-00-106-8925	NA1120	flammable	4 liters	glass bottles
Carbon tetrachloride	F001/ CA179	NA9099	ORM-E		1 liter	glass bottle
Chloroform	U044/CA194	6505-00-753-4775	UN1888	ORM-A	27 liters	glass bottles
Dichloromethane	U067		UN1593	ORM-A	4 liters	glass bottles
2-Ethoxy ethanol				flammable	4 liters	glass bottle
Ethyl acetate	U112/CA317		UN1173	flammable	2 liters	glass bottle
Hexane	CA372		UN1208	flammable	8 liters	glass bottles
2-Methoxyethanol				flammable	4 liters	glass bottle
Propanol	CA634				4 liters	glass bottle
Pyridine	U196/CA642		UN1282	flammable	1 liter	glass bottle
Tetrahydrofuran	U213/CA719		UN2056	flammable	27 liters	glass bottles
Toluene	U220/CA738		UN1294	flammable	4 liters	glass bottle
Xylene	U239/CA77	6810-00-753-4787	UN1307	flammable	4 liters	glass bottle

HAZARDOUS WASTE CHEMICALS INVENTORY FORM

OFFICE SYMBOL: HSHH-MB
POINT OF CONTACT: Sgt. Gatlins
TELEPHONE NUMBER: 45953

BUILDING: 1063-CRIB
ROOM:

CHEMICAL NAME (DO NOT ABBREVIATE)	CONTAINER QUANTITY	CONTAINER SIZE	CONTAINER TYPE	CHEMICAL QUANTITY	CHEMICAL UNIT	L OR S[1]	DOT HAZARD CLASS[2]
R2-2 6505-01-185-8848 Streptomycin	24 Bx	50x	0.5 ML	6	lb	S	
and Neomycin Poliovirus	24	0.5	Pipettes				
R1-2 6505-01-246-3790 Interferon							
BACTERIOSTATIC	14	1 gm	Glass Vl	1	lb	S	
GLYCINE sodium phosphate							
tetracycline Hydrochloride							
3-3D 6505-00-118-2776- Indomethacin							
CHLOROBENZOYL, METHOXY, METHYL	6	25mg	Pg	1	lb	S	
ACETIC-ACID							
B-2B 6505-00-299-8760 adrenalin chloride	8	25Amp	Bx				
CHLORETONE, CHLOROFORM, Sodium bisulfite							
DIHYDROXY, METHYLAMINO BENZYL							
	8X 25ML = 200			1	lb	S	

(DEH, EDCO, NOV 88) (1) L = LIQUID, S = SOLID (2) REF. DRAFT PSF REGULATION NO. 420-47

OFFICE SYMBOL: HSHH-MB
POINT OF CONTACT: Sgt GATLING
TELEPHONE NUMBER: 45953

BUILDING: 1063 CRIB
ROOM:

CHEMICAL NAME (DO NOT ABBREVIATE)	CONTAINER QUANTITY	CONTAINER SIZE	CONTAINER TYPE	CHEMICAL QUANTITY	CHEMICAL UNIT	L OR S (1)	DOT HAZARD CLASS (2)
2 12 6505-00-106-9000 AMYL	5	0.3 mL	Capsule	1	lb	S	
NITRITE, METHYL BUTANOL, Epoxol		= 9 mL.					
3 6505-01-046-1436 HYDRALAZINE							
HYDRALAZINE, MONHYDROCHLORIDE	1	25mg	Tablet	1	lb	S	
CRYSTALLINE, HYDRAZINOPHTHALAZINE							
2 10 6505-01-128-5932 MATULANE	4	50mg	100 mg	1	lb	S	
teratogenesis, carcinogenesis							
cytotoxicity, Reticuloendothelial							
Thromboscytic							
NITROGLYCERIN				15	lb	S	

(DEH, DECO, NOV 88) (1) L = LIQUID, S = SOLID | (2) REF. DRAFT PSF REGULATION NO. 420-47

HAZARDOUS WASTE CHEMICALS INVENTORY FORM

PAGE 1 OF ____

OFFICE SYMBOL: HSHHRX
POINT OF CONTACT: LTC Richard W. Ihlenfeld
TELEPHONE NUMBER: 561-2976

BUILDING: 1100
ROOM: 116

CHEMICAL NAME (DO NOT ABBREVIATE)	CONTAINER			CHEMICAL			DOT HAZARD CLASS (2)
	QUANTITY	SIZE	TYPE	QUANTITY	UNIT	L OR S (1)	
NONE							

HAZARDOUS WASTE CHEMICALS INVENTORY FORM

PAGE 1 OF ___

OFFICE SYMBOL: HSHH-PM-HP (Health Physics)
POINT OF CONTACT: MAJ Bergsagel
TELEPHONE NUMBER: 4-2794

BUILDING: 1007 Letterman Army Med Ctr
ROOM: Ground Floor

CHEMICAL NAME (DO NOT ABBREVIATE)	CONTAINER QUANTITY	CONTAINER SIZE	CONTAINER TYPE	CHEMICAL QUANTITY	CHEMICAL UNIT	CHEMICAL L OR S (1)	DOT HAZARD CLASS (2)
None							
Carl E Bergsagel MAJ, MS							
NONE							

(DEH, EECO, NOV 88) (1) L = LIQUID, S = SOLID (2) REF. DRAFT PSF REGULATION NO. 420-47

ENCL 1

COMMERCIAL NAME	EPA NO./CA NO.	NSN	ID NO.	HAZARD CLASS.	QUANT.	CONTAINER
Acetone	U002/CA003	6505-00-616-7861	UN1090	flammable	22 liters	glass bottles
Acetone	U002/CA003	6505-00-616-7861	UN1090	flammable	8 liters	aluminum cans
Benzene		6810-00-753-4778	UN1114	flammable	6 liters	glass bottles
Butanol	CA137	6810-00-106-8925	UN1120	flammable	4 liters	glass bottles
Carbon tetrachloride	F001/ CA179	NA9099	ORM-E		1 liter	glass bottle
Chloroform	U044/CA194	6505-00-753-4775	UN1888	ORM-A	27 liters	glass bottles
Dichloromethane	U067		UN1593	ORM-A	4 liters	glass bottles
2-Ethoxy ethanol				flammable	4 liters	glass bottle
Ethyl acetate	U112/CA317		UN1173	flammable	2 liters	glass bottle
Hexane	CA372		UN1208	flammable	8 liters	glass bottles
2-Methoxyethanol				flammable	4 liters	glass bottle
Propanol	CA634				4 liters	glass bottle
Pyridine	U196/CA642		UN1282	flammable	1 liter	glass bottle
Tetrahydrofuran	U213/CA719		UN2056	flammable	27 liters	glass bottles
Toluene	U220/CA738		UN1294	flammable	4 liters	glass bottle
Xylene	U239/CA77	6810-00-753-4787	UN1307	flammable	4 liters	glass bottle

HSHH-AMB (AFZM-DEH-EE/10 Nov 88) 1st End MAJ Foster/dlw/5255
SUBJECT: Identification of Hazardous Waste Inventories

Cdr, Letterman Army Medical Center, ATTN: Ambulatory Care Support Branch, Presidio of San Francisco, CA 94129 8 Dec 88

FOR: Department of Engineering and Housing, ATTN: Environment & Energy Office, Presidio of San Francisco, CA 94129-6700

The Department of Ambulatory Care maintains no hazardous waste.

MICHAEL J. FOSTER
MAJ, MS
C, ACSB

HSHH-CSD (10 Nov 88) (40) 1st End LTC Beringer/zm/AV586-3122
SUBJECT: Identification of Hazardous Waste Inventory

Cdr, Letterman Army Medical Center, Presidio of San Francisco, CA
94129-6700 2 Dec 88

FOR: Commander, HQ, United States Army Garrison, ATTN: AFZM-DEH-EE, Presidio of San Francisco, CA 94129-5000

Negative report.

Encl
nc

GEORGE R. BERINGER
LTC, MS
Chief, Clinical Support Division

DEPARTMENT OF THE ARMY
HEADQUARTERS PRESIDIO OF SAN FRANCISCO
OFFICE OF THE COMMANDING OFFICER
PRESIDIO OF SAN FRANCISCO, CALIFORNIA 94129-5000

REPLY TO
ATTENTION OF:

13 APR 1989

AFKC-ZM-DEH-EE

MEMORANDUM FOR: SEE DISTRIBUTION

SUBJECT: Identification of Hazardous Waste Inventories

1. The purpose of this correspondence is to obtain your inventory of hazardous waste stored at the Presidio of San Francisco, sub installations, and Reserve Centers to initiate disposal procedures. Additionally, request that you provide names of individuals who routinely handle hazardous waste for your activity in order to identify and program future training requirements.

2. All generators of nonexcluded hazardous waste must prepare a Hazardous Waste Inventory Form, Encl 1, as outlined in the Draft PSF Regulation No. 420-47, "Environmental Quality: Hazardous Waste Management." Generators who have no waste to report should provide a negative response.

3. Part 4, Section A, Paragraph (4) of the referenced regulation emphasizes that the increased complexity of hazardous waste disposal is resulting in increased disposal costs. Generators are requested to minimize such wastes by recycling or using alternative materials. Your efforts in this area are most appreciated as they allow the wise expenditure of currently austere funds.

4. Recyclers are available for such laboratory items as unused solvents, chlorinated or halogenated solvents, expired and excess laboratory chemicals, and acids and alkalis. Uncontaminated quantities of such items greater than 2 liters (1/2 gallon) should be kept pure and reported as pure excess. Paint thinners and solvents, and mobile shop solvents should not be mixed with oil or water, as they too can be recycled.

5. Request that you submit the names of individuals involved in hazardous waste management and return completed inventory forms to the Environmental and Energy Office by 21 April 89. Forms must be legible, preferably typed, and include all information for each item. Contact Alex Marievich at 561-5176 for additional information.

FOR THE COMMANDER:

1 Encl

CLIFFORD N. GOFF
COL, EN
Dir, Engineering and Housing

DISTRIBUTION:
C, Dept of Pathology, LAMC
C, Dept of Nursing, LAMC
C, Dept of Radiology, LAMC
C, Dept of Pharmacy, LAMC
C, Dept of Ambulatory Care, LAMC
C, Logistics Division, Bldg. 1060
C, Dept of Clinical Investigation
C, Dept of Surgery, LAMC
C, Dental Activity, LAMC
C, Health Physics, Bldg. 1007, LAMC
C, Housekeeping Branch, LAMC
C, Veterinary Activity, LAMC
C, Physical Medicine and Rehab Svcs, LAMC
C, Dept of Medicine, LAMC
C, Hospital Engineers, LAMC
C, Clinical Support Div, LAMC
C, Dept of Psychiatry, LAMC
C. Dept of Gynecology, LAMC

HAZARDOUS WASTE CHEMICALS INVENTORY FORM

OFFICE SYMBOL RVL
POINT OF CONTACT Henry Watson
TELEPHONE NUMBER 521-4614

BUILDING LAIR
ROOM RS 4421

Chemical Name (Do Not Abbreviate)	Container Quantity	Container Size	Container Type	Chemical Quantity	Chemical Unit	Chemical L or S	DOT HAZARD CLASS
1. Nitric Acid and Water	600 ml	1 gal	Glass	600 ml	1	Liquid	Corrosive
2. Salt Waste (Nitric acid and Water, silver nitrate, ammonium thiocyanate)	2000 ml	1 gal	Glass	2000 ml	1	liquid	Oxidizer
3. Pesticides waste (Hexane, methylene chloride acetone, ether)	3.5 l	1 gal	glass	3.5 l	1	liquid	flammable/toxic
4. Waste oil from commissary (?)	3.5 l	1 gal	glass	3.5 l.	1	liquid	

Clinical Investigation

HAZARDOUS WASTE CHEMICALS INVENTORY FORM

OFFICE SYMBOL: HSHH-CI
POINT OF CONTACT: SSG STINNETT
TELEPHONE NUMBER: 221-7679

BUILDING: 1801
ROOM: 6120

CHEMICAL NAME (DO NOT ABBREVIATE)	CONTAINER			CHEMICAL			DOT HAZARD CLASS (2)
	QUANTITY	SIZE	TYPE	QUANTITY	UNIT	L OR S (1)	
N-Diethyl Nitrosamine, N-Dimethyl nitrosamine, Hexane, Methylene Chloride	4	4 l	glass bottle	16	liter	L	Flammable liquid ORM-A
Hexane & Methylene Chloride	2	4 l	glass bottles	8	liter	L	Flammable liquid ORM-A
Potassium Cyanide	1	1 lb.	glass bottle	1	lb	S	Poison B
Propidium Iodide	<1mg	100mg	glass bottle	<5mg	mg	S	Carcinogen

ATTN: Alex Marievich - Attached is the Hazardous Waste Inventory for the Dept of Path, LAMC.

DISTRIBUTION:
C, Dept of Pathology, LAMC
C, Dept of Nursing, LAMC
C, Dept of Radiology, LAMC
C, Dept of Pharmacy, LAMC
C, Dept of Ambulatory Care, LAMC
C, Logistics Division, Bldg. 1060
C, Dept of Clinical Investigation
C, Dept of Surgery, LAMC
C, Dental Activity, LAMC
C, Health Physics, Bldg. 1007, LAMC
C, Housekeeping Branch, LAMC
C, Veterinary Activity, LAMC
C, Physical Medicine and Rehab Svcs, LAMC
C, Dept of Medicine, LAMC
C, Hospital Engineers, LAMC
C, Clinical Support Div, LAMC
C, Dept of Psychiatry, LAMC
C, Dept of Gynecology, LAMC

Please call CPT Perry X2560 with the date of pick-up. We are in dire straits and need a pick-up as soon as possible. If I'm not here, please leave a message(I'm on leave 20-25 Apr). Thank you.

Elaine S. Perry

ELAINE S. PERRY
CPT, MS
Safety Officer, DPALS

HAZARDOUS WASTE CHEMICALS INVENTORY FORM

PAGE____ OF____

OFFICE SYMBOL:
POINT OF CONTACT: SSG Ramos
TELEPHONE NUMBER: 46219

BUILDING: 1100
ROOM: 200

CHEMICAL NAME (DO NOT ABBREVIATE)	CONTAINER QUANTITY	CONTAINER SIZE	CONTAINER TYPE	CHEMICAL QUANTITY	CHEMICAL UNIT	CHEMICAL L OR S (1)	DOT HAZARD CLASS (2)
Xylene + Formalin + Alcohol	20	5 Gl				L	
Calcium chloride	3	5 Lbs				S	
Araldite Resin	5	16 oz				L	
Vinylcyclohexene Dioxide	2	16 oz				L	
Diglycidyl ether of Polypropylene	1	16 oz				L	
Dimethylaminoethanol	1	7 oz				L	
J.B-4 Solution B	2	50 ml				L	
(1) 5-gal containers are stored over @ LAIR - we ran out of space.							

(BEL. PRCO ... L = LIQUID S = SOLID (2) ... DOT REGULATION ...

LIST OF HAZARDOUS WASTES
AND
MATERIALS

…ING: 1100 LOCATION: DEPT OF PATHOLOGY RM 202/Wash Room POC: SFC GUNN TELEPHONE: 561-6200

…ICAL CHEMICAL NAME …NOT ABBREVIATED)	NATIONAL STOCK NUMBER OR LOCAL STOCK NUMBER	EPA NO. or CA NO. or HAZARD MATERIAL CATEGORY	SIZE and TYPE OF CONTAINER	QUANTITY AND UNIT OF MEASURE	DOT ID NO.	DOT HAZARD CLASS
…HYL ETHER		U117/CA332	1 LITER PolyEthylene BOTTLE	2.5 LITER	UN 1155	FLAMMABLE LIQUID
…% Hydrochloric Acid …% PROPANOL		CA381 /CA631	1 PINT PolyEthylene BOTTLE	54 PTS	UN 1789	CORROSIVE Flammable Liquid
…HYL ACETATE		U112 / CA317	5 GALLON METAL CANS marked 1114	8545 Ml	UN ~~1294~~ 1173	Flam. Liquid
…LUENE		U220 /CA738		2010 Ml	UN 1294	FLAM Liquid
…CHLOROMETHANE		~~U067~~		312 ML	UN 1593	ORM-A
…HLOROFORM		U044/ CA194		615 Ml		ORM-A
…ETROLEUM ETHER		/		8 Ml		Flam. Liquid
…~~TH~~ANOL		CA 318		509 ML	UN 1170	Flam. Liquid
…ERCAPTOETHANOL				1 ML	UN 1993	Flam. Liquid
…ENYL HYDRAZINE				124 ML		
…ssium Dichromate		CA617		12.6 Ml	NA 1479	
…~~Butanol~~						
	Remainder	is Aqueous & Body	Fluids			
…chloric Acid			1 Pint Glass BOTTLE	1 PT.		Corrosive material

LIST OF HAZARDOUS WASTES
AND
MATERIALS

[illegible]: 1100 LOCATION: DEPT OF PATHOLOGY RM 202/WASH [illegible] POC: SFC GWAN TELEPHONE: 561-6200

[illegible] CHEMICAL NAME (DO NOT ABBREVIATE)	NATIONAL STOCK NUMBER OR LOCAL STOCK NUMBER	EPA NO. or CA NO. or HAZARD MATERIAL CATEGORY	SIZE and TYPE OF CONTAINER	QUANTITY AND UNIT OF MEASURE	DOT ID NO.	DOT HAZARD CLASS
[E]THYL-ACETATE		U112/CA317	5 GALLON METAL CAN MARKED 90119	2425 ML	UN1173	FLAM. LIQUID
TOLUENE		U220/CA738		1315 ML	UN1294	FLAM LIQ
[D]ICHLOROMETHANE		U067		2320 ML	UN 1593	ORM-A
[C]HLOROFORM		U044/CA194		195 ML		ORM-A
[PE]TROLEUM, ETHER				2.2 ML		FLAM LIQ
[E]THANOL		CA 318		6600 ML	UN 1170	FLAM LIQ
[M]ETHYL ISO BUTYL KETONE		U161		16 ML		
[M]ERCAPTO ETHANOL				TRACE ~~ML~~	UN1993	FLAM LIQ
[P]HENYL HYDRAZINE				63 ML		
[P]OTASSIUM DICHROMATE		CA 617		3g	NA 1479	
	REMAINDER IS AQUEOUS & BODY FLUIDS					

HSHH-PM 9 June 89

SUBJECT: MEMORANDUM FOR RECORD

1. Hazardous waste (enclosure) generated at Letterman Army Medical Center was removed by contracting personnel on 9 June 89.

2. POC for this action is the undersigned.

Thomas J. Little

THOMAS J. LITTLE
CPT, MS
ESO

HAZARDOUS WASTE CHEMICALS INVENTORY FORM

OFFICE SYMBOL: HSHH-PM-HP (Health Physics)
POINT OF CONTACT: MAJ Bergstrye
TELEPHONE NUMBER: 2794

BUILDING: 1007
ROOM: Lower

CHEMICAL NAME (DO NOT ABBREVIATE)	CONTAINER			CHEMICAL			DOT HAZARD CLASS (2)
	QUANTITY	SIZE	TYPE	QUANTITY	UNIT	L OR S (1)	
None							

HSHH-ZCP (HSHH-PM/25 May 89) 1st End Mr Roberts/db/3378
SUBJECT: Hazardous Material Inventory

Chief, Medical Photography, LAMC 9 Jun 89

FOR Chief, Preventive Medicine Service, LAMC

1. Medical Photography does use developers containing small amounts of hazardous chemicals, but the chemicals are diluted to a point where they should not be considered hazardous. The developers are used in Medical Photography, Bldg 1009, Room 208 and in Bldg 1007, first floor. All the developers are disposed of by diluting them with water x4 in the chemical mixing sinks. The only chemical that is collected by the Material Branch is Rapid Fixing Bath (Hypo).

2. The chemical composition of the developers and fixers used by this activity are described in the attached enclosures from Photo-Lab Index, Morgan & Morgan Inc. The amounts used by Medical Photography are as follows:

DEVELOPER	QUANTITY USED (per month)	
Kodak D-19	1	gallon
Kodak DK-50	3.5	gallons
Kodak D-72 (Dektol)	4	gallons
Kodak D-76	1	gallon
Kodak D-11	3.5	gallons
Kodak Microdol-X	1	gallon
Kodak S11 Activator	2	pints
FIXING BATH (hypo)		
Kodak Rapid Fixing Bath	6	gallons
Hypo Eliminator	3	gallons
Kodak S30 Stabilizer	2	pints
CLEANER		
Kodak Developer System Cleaner	2.7	ounces

11 Encls

Harry J Roberts
HARRY J. ROBERTS
Chief, Visual Information

HSHH-PED 5 JUN 89

MEMORANDUM FOR C, PREVENTIVE MEDICINE SERVICE

SUBJECT: Hazardous Material Inventory

The following hazardous materials are used or stored in the Pediatric Clinic RM# 211,BLDG 1100.

ITEM	ARCH.#	QTY.	METH. OF DISPOSAL
A.BLEACH	2-21-16	2 gals.	poured down drain
B.ACETONE	2-21-16	1 qt.	consumed during procedure
C.ACTIVATED DIALDEHYDE	2-21-16	1 gal.	poured down drain
D.A-500	2-21-16	2 cans	poured down drain
E.BLOOD CULTURE BOTTLES	2-21-19	18 btls	consumed during procedure
F. O2	2-21-19	2 sm.tks	consumed during procedure

ROBERT A JACKSON
SGT,USA
NCOIC,PED.CLINIC

HSHH-SUR-GY 07 JUN 89

MEMORANDUM FOR C, PREVENTIVE MEDICINE SERVICE

SUBJECT: Hazardous Material Inventory

The following hazardous materials are used or stored in the Gyn/Walk-In Clinics RM# 215 Bldg. # 1100.

ITEM	LOCATION	QTY.	METHOD OF DISPOSAL
A. Bleach	2-22-27	3 gals.	Poured down drain
B. Blood Culture Bottles	2-22-18	3 Btls.	Consumed during procedure Returned to Lab if expired
C. Hydrogen Peroxide	all exam rooms	11 Btls.	Consumed during procedure
D. Alcohol	all exam rooms	11 Btls.	Consumed during procedure
E. Haemo-Sol	2-22-27 2-22-28	20 lbs.	Poured down drain
F. A-500	2-22-27 2-22-28	6lbs.	Poured down drain
G. Cidex 7	2-22-27	2 gals.	Poured down drain

Roslyn C. Banks

ROSLYN C. BANKS
SPC, USA
NCOIC, Gyn Clinic

HSHH-RAD 14 June 1989

MEMORANDUM FOR Chief, Preventive Medicine Service

SUBJECT: Hazardous Material Inventory

1. The Department of Radiology uses toxic mixtures in the form of developer and fixer. These mixtures are stored in the radiology supply room (#2-52-06) in quantities that rarely exceed 500 gallons (total) at any one time. These mixtures are disposed of via a drain. CPT Little was informed of this method of disposal approximately two months ago.

2. Radioactive materials are used by the nuclear medicine service. General information is listed below. Specific information may be obtained by contacting LTC Stotler, 43088.

Material	Storage Location*	Amount Stored	Disposal^
Technesium 99M	2-20-10	Millicuries	Used
Galium 67	2-20-10	Millicuries	Used
Thalium 201	2-20-10	Millicuries	Used
Gadolinium 53	2-20-10	Millicuries	Used
Indium 111	2-20-10	Millicuries	Used

* Bldg 1100

^ Occasionally turned in to Radiation Protection Officer for other means of disposal.

3. POC for further information is CPT Krogman, 43828.

RAOUL O. HAGEN
COL, MC
Chief, Department of Radiology

HSHH-LOG-BM (340d) 13 June 1989

MEMORANDUM FOR Chief, Preventive Medicine Service

SUBJECT: Hazardous Material Inventory

1. The following hazardous materials are located in the Biomedical Maintenance Branch:

ITEM	QUANTITY	LOCATION	DISPOSAL
Spray Paint	6 cans	Flammable Cabinet	Consumed
Solvents	9 cans	Flammable Cabinet	Consumed
Grease	2 tubs	Flammable Cabinet	Consumed
Dry Cleaning Fluids	5 cans	Flammable Cabinet	Consumed
Paint Thinner	4 cans	Flammable Cabinet	Consumed
Processor Fluids	2 bottles	Flammable Cabinet	Consumed
Solder Rosin	15 bottles	Tech's Workbenches	Consumed

2. Point of contact is SSG Owens at exts. 5007 or 3432.

Byron Y. Owens

BYRON Y. OWENS
SSG, USA
Shop Foreman, Biomed. Maint. Br.

HSHH-RX

MEMORANDUM FOR PREVENTIVE MEDICINE

9 June 1989/ad

SUBJECT: Hazardous Material Inventory

1. The following list of medications are identified as hazardous materials in the Pharmacy Service, Room #116, Manufacturing and Compounding Section. The method of disposal is by removal by hazardous material contract personnel.

Medication	Quantity
Aluminum Potassium Sulfate	9 Bts
Benzyl Alcohol	3 Bts
Ferric Subsulfate Solution	6 Bts
Strong Iodine Solution	10 Bts
Pilocarpine HCl	2 Bts
Podophyllum Resin	2 Bts
Potassium Hydroxide	3 Bts
Resorcinol Crystals	2 Bts
Salicylic Acid Powder	1 Jar
Silver Nitrate	1 Bt
Sodium Nitrate	3 Bts
Sodium Nitrite	1 Bt
Sodium Thiosulfate	1 Bt
Sufosalicylic Acid	1 Bt
Thymol Crystals	2 Bts
Trichloroacetic Acid	4 Bts

2. The following list of medications are stored in an approved storage cabinet constructed in accordance with the National Fire Protection Association No. 3, which meets OSHA requirements.

Medication	Quantity
Acetic Acid	2 Bts
Acetones ACS	14 Bts
Alcohol Isopropyl 70%	30 Cases
Alcohol Isopropyl 99%	26 Bts
Benzoic Tinc Compound	4 Cans
Chloroform	2 Bts
Collodion USP	1 Bt
Collodion Flexible	6 Bts
Formaldehyde	4 gals
Hydrochloric Acid	11 Bts
Methanol ACS	2 Pts
Phenol Crystals	3 Bts

Aundra L. Davis
AUNDRA L DAVIS
SSG USA
PHARMACY HAZCOM MANAGER

HSHH-AMB-SA 16 Jun 89

MEMORANDUM FOR C, Preventive Medicine Services, LAMC

SUBJECT: Hazardous Material Inventory

The following hazardous materials are located in the US Army Health Clinic, Sacramento, Bldg. 154:

PRODUCT_NAME	QUANTITY	LOCATION	METHOD_OF_DISPOSAL
ACETONE	5	Pharmacy	Consumed during procedur
ACETONE	1	Treatment Room	Consumed during procedur
ACID, NITRIC	1	Ind. Hygiene	Disposal on post
ALCOHOL, ISOPROPYL	12	Pharmacy	Consumed during procedur
ALCOHOL, ISOPROPYL	3	Treatment Room	Consumed during procedur
ALCOHOL, BENZOIN TINCTURE	1	Treatment Room	Transfer to LAMC for disposal
CARBON MONOXIDE	1	Ind. Hygiene	Disposal on post
CORRECTION FLUID	5	Admin Areas	Place in trash
ELECTROMIX	1	Ind. Hygiene	Disposal on post
HYDROGEN PEROXIDE SOLN	14	Pharmacy	Transfer to LAMC for
HYDROGEN PEROXIDE SOLN	3	Treatment Room	disposal
LIQUID MERCURY	1	Ind. Hygiene	Disposal on post
POTASSIUM HYDROXIDE	2	Laboratory	Consumed during procedur
PROPANE, LIQUID	1	Ind. Hygiene	Disposal on post
POVIDONE IODINE	2	Pharmacist	Trans to LAMC for
POVIDONE IODINE	2	Treatment Room	disposal
SODIUM HYDROXIDE	2	Ind. Hygiene	Disposal on post
CLEANER, ANTISTATIC	1	X-ray	Consumed during procedur
CLEANER, DEVELOPER SYSTM	2	X-ray	Consumed during procedur
CLEANER, FIXER SYSTEM	7	X-ray	Consumed during procedur
CLEANER, X-RAY SCREEN	1	X-ray	Consumed during procedur

HSHH-AMB-SA 16 Jun 89

MEMORANDUM FOR C, Preventive Medicine Services, LAMC

SUBJECT: Hazardous Material Inventory

DEVELOPER STARTER	4	X-ray	Flush to sewer
X-RAY FIXER STAIN REMOVR	1	X-ray	Consumed during procedu
X-RAY FIXER REPLENISHER	3	X-ray	Recovered for silver content(disposal on pos
X-RAY DEVELOPER SOLUTION	2	X-ray	Flush to sewer

GULABDAS D. HARIYANI, M.D.
Medical Director

HSHH-MP (190) 1 JUN 89

MEMORANDUM FOR CHIEF, PREVENTIVE MEDICINE SERVICE

SUBJECT: Hazardous Material Inventory

1. Reference Memorandum, dated 25 May 89, subj: Hazardous Material Inventory, COL R.W. Fellini.

2. This office does not use hazardous materials.

3. POC for more information is the undersigned, ext 4854.

GERALD R. ANDREWS, JR.
CPT, MP
LAMC Provost Marshal

FILE COPY

[18] From: LTC TANCREDI 6/1/89 7:59AM (466 bytes: 8 ln)
To: COL FELLINI
Subject: HAZARDOUS MATERIAL INVENTORY

NEGATIVE REPORT FROM MY SHOP. TO THE BEST OF MY KNOWLEDGE I DON'T THINK I HAVE ANY SUCH STUFF. I PUT THAT BOTTLE OF OLD KENTUCKY I USE TO KEEP IN THE BOTTOM DESK DRAW TO GOOD MEDICAL USE, SO I CAN'T EVEN COUNT THAT IN THE INVENTORY ANY MORE!!??**

PETE

·CHEMICALS
REGIONAL VETERINARY LABORATORY
Chemistry Departments LR 1147 and LR 1158

1. Absorptive Magnesia
2. Acetonitrile - flammable and toxic
3. Acetyl Chloride - irritable and corrosive
4. Acetone - flammable
5. Acetic Acid Glacial -flammable and toxic
6. Aluminum Potassium Sulfate Dodecahydrate
7. Alumina Activated - irritable
8. Alumina, Basic Brockman Activity I
9. Ammonium Carbonate
10. Ammonium Chloride
11. Ammonium Citrate
12. Ammonium Acetate
13. Ammonium Hydroxide - irritable
14. Ammonium Nitrate - corrosive and flammable
15. Ammonium Oxalate, Monohydrate
16. Ammonium Phosphate
17. Ammonium Phosphate, Monobasic
18. Ammonium Sulfate
19. Ammonium Vanadate
20. Antimony Potassium Tartrate
21. Arachidic Acid
22. Arachidic Acid Methyl Ester
23. Arsenic Trioxide - toxic
24. Antimony Trichloride - slightly toxic
25. Azobenzene - toxic
26. L-Ascorbic Acid
27. Basic Fuchsin
28. Barium Chloride Dihydrate - toxic
29. Barium Hydroxide - highly toxic
30. Benzidine - carcinogen
31. Benzene - flammable and toxic
32. Bismuth Nitrate - toxic
33. Bovine Serum Albumin
34. Borax
35. Boileezers
36. Bromocresol Purple
37. Bromocresol Green
38. Bromophenol Blue
39. Bromthymol Blue
40. Brucine Sulfate
41. Cadaverine - toxic
42. Cadmium Chloride - toxic
43. Cadmium Sulfate
44. Calcium Chloride Anhydrous - toxic
45. Calcium Oxide - flammable and toxic
46. Calcium Sulfate
47. Carbon Disulfate
49. Carbon Tetrachloride - flammable and toxic
50. Celite

105. Mercuric Ioxide
106. Mercuric Thiocyanate
107. Mercuric Oxide, Yellow
108. Meta-phosphoric acid - irritable
109. Methenamine
110. Mercury Bichloride
111. Methyl Orange, Sodium Salt
112. Methyl Red
113. Methyl Violet 2B
114. Methuylamine Hydrochloride
115. Molybdenum Trioxide
116. Moybdic Anhydride
117. Momoolein
118. Monodasylcadaverine
119. Myristic Acid
120. Myristic Acid Ester
121. Nitric Acid - corrosive
122. N-1-Napthylethylenediamine Dihydrochloride
123. N-N-Dimethyl-p-phenylazoaniline
124. 1-Naphthylamine
125. n-Butyl Alcohol - flammable
126. n-Valeric Acid
127. Oleic Acid
128. o-Tolidine - flammable and toxic
129. o-Cresolulfonephthalein
130. Pararosaniline Hydrochloride
131. Petroleum Ether - flammable
132. Periodic Acid
133. Phenolphthalein
134. Phosporic Acid - corrosive
135. Phosphotungstic Acid
136. Phenyhlarsine Oxide
137. Phthalic Acid Monopotassium Salt
138. p-Phenylazoaniline
139. Phloroglucinol, Dihydrate - toxic
140. Potassium hydroxide - toxic
141. Potassium Iodide
142. Potassium Bisulfate
143. Potassium Bi-iodate
144. Potassium Bromate
145. Potassium Biphthlate
146. Potassium Ferrocyanide
147. Potassium Hydrogen Phthalate
148. Potassium Chloride
149. Potassium Nitrate - toxic
150. Potassium Persulfate - flammable
151. Potassium Phosphate Monobasic
152. Potassium Sodium Tartarate
153. Potassium Sulfate
154. Potassim Permanganate - corrosive
155. Putrescine - toxic
156. Pyrazinamide - toxic
157. Pyrogallon
158. p-Dimethylaminobenzaldehyde

159. p-Nitroaniline - toxic
160. 2-Propanol - flammable and toxic
161. Quinoline - flammable
162. Resorcinol - flammable and toxic
163. Rhodanine B
164. Saccharine Sodium
165. Silica Gel Desiccant
166. Soda Lime
167. Salicylic Acid - flammable and irritable
168. Sodium Acetate - flammable and mildly toxic
169. Sodium Arsenate
170. Sodium Azide
171. Sodium Bisulfite - toxic
172. Sodium Carbonate - irritable
173. Sodium Chloride - toxic
174. Sodium Citrate
175. Sodium Benzoate
176. Sodium Dichromate - flammable and toxic
177. Sodium Diethyldithicarbamate
178. Sodium Dithionite
179. Sodium Hydroxide - flammable and toxic
180. Sodium Bromate, 10-Hydrate
181. Sodium Metaborate
182. Sodium Molybdate
183. Sodium Sulfate
184. Sodium Thiosulfate - toxic
185. Sodium Phosphate Tribasic
186. Sodium
187. Sodium Tartrate
188. Sodium Sulfite - toxic
189. Sodium Sulfide - flammable and toxic
190. Sodium meta-Periodate
191. Sodium Thiosulfate, 5-hydrate
192. Silver Nitrate - flammable and irritable
193. Silver Sulfate
194. Silver Diethyldithiocarbamate
195. Starch, soluble potato
196. Stannous chloride
197. Sulfanilamide
198. Sulfanilic Acid
199. Sulfuric Acid
200. Sublimed Sulfite
201. Sublimed Sulfur
202. Succinic Acid
203. Tetramethyl-ammoniuim Chloride
204. Tristearin
205. Triton
206. Theobromine
207. Vanillin
208. Zinc Metal - flammable and toxic
209. Zinc Mossy - flammable and toxic
210. α - Monopalmitin
211. β - Lactolobulin A
212. β - Lactolobulin B

213. β - Lactolobulin A and B
214. 1-Hexanesulfonic Acid, Sodium Salt
215. 1-4 Dioxane
216. 1,2-Diolein
217. 1,3-Diolein
218. 2,3-Butanedione Monoxine
219. 2,6-Dichloroindophenol Sodium Salt
220. 2-Bromoacetophenone
221. 2-Butoxyethanol
222. 2-Thiobarbituric Acid - toxic
223. 2,-Dinitrophenylhydrazer
224. 4-Aminantipyrine
225. 4,5-Dihydroxy-2-7-naphthalene disulfonic Acid

METHOD OF DISPOSAL: Removed by contract personnel.

CHEMICALS
REGIONAL VETERINARY LABORATORY
Rabies Room and Food Microbiology
LR 1106 LR 1152

1. Acetone - flammable and toxic
2. Flourescent Immersion Oil - flammable
3. FTA Hemaglutination Buffer
4. Anti-rabies Globulin Flourescein Labeled
5. Pentex Bovine Albumin
6. Buffered Glycerol Mounting Medium
7. Metofane (Methoxyflurane)

LR 1106

8. Acriflavin (Euflavin) Hydrochloride
9. Agarose (Indubiose A 45)
10. Ammonium Oxalate
11. Ammonium Sulfate
12. Alphanaphthol
13. L-Ascorbic Acid
14. Barbital - toxic
15. Barium Chloride - flammable
16. Boric Acid
17. Calcium Carbonate
18. Calcium Chloride
19. Citric Acid
20. Creatine
21. L-Cysteine
22. Dextrose, Anhydrous
23. Dimethylaminobenzaldehyde
24. Esculin Hydrate
25. Ferric Ammonium Sulfate - toxic
26. Ferric Ammonium Citrate
27. Ferric Chloride, Anydrous
28. Ferric Citrate
29. Ferrous Sulfate
30 Glycine, 99.5%, (Ammonia free)_
31. Glycine Anhydride
32. Gelatin, Powder USP
33. Hemoglobin
34. Hepes (n-2-hydroxyethylpiperazine N-2-ethanesulfonic Acid)
35. L Histidine (Freebase)
36. L-Histidine HCl
37. Hippuric Acid Sodium Salt
38. Iodine
39. Lauryl Sulfate (Sodium Salt)
40. Lithium Chloride, Anhydrous
41. L-trysine
42. Magnesium Acetate
43. Magnesium Chloride, 6-hydrate, crystal - toxic
44. Magnesium Sulfate, Anyrdrous
45. Magnesium sulfate GR crystals
46. Manganese Sulfate Monohydrate
47. Mercaploacetic Acid Sodium Salt, Practical
    (Sodium Thioglycolate)
48. Mercuric Chloride - corrosive and toxic

49. 1-Naphthol - toxic
50. 1-Naphthylamine - toxic
51. Nicotinic Acid (Niacin, Pyridine-3-carboxylic Acid)
52. L-Ornithine Hydrochloride
53. Acid Oxalic - toxic
54. Pectin (Citrus)
55. Phenol, U.S.P. Crystals - flammable and toxic
56. Polygalacturonic Acid, Sodium Salt
57. Potassium Chloride
58. Potassium Hydroxide, ACS, Pellets - flammable and toxic
59. Potassium Iodine, U.S.P. Granular
60. Potassium Metabisulfite
61. Potassium Nitrate - toxic
62. Potassium Oxalate
63. Potassium Phosphate, dibasic
64. Potassium Phosphate, monobasic
65. Potassium Sodium Tartrate
66. Potassium Tartrate, crystal
67. Sephadex G-25
68. Sodium Acetate - flammable
69. Sodium Azide
70. Sodium Bisulfate, Monohydrate - toxic
71. Sodium Bisulfite - toxic
72. Sodium Carbonate , Anhydrous - toxic
73. Sodium Citrate
74. Sodium Desoxyolate
75. Sodium Hydroxide - flammable and toxic
76. Sodium Hippurate
77. Sodium Oxalate
78. Sodium Phosphate, dibasic
79. Sodium Phosphate, monobasic
80. Sodium Sulfate, Ahydrous
81. Sodium Sulfite, Ahydrous
82. Acid Fuchsin
83. Acridine Orange Stain
84. Auramine O
85. Basic Fuchsin
86. Brilliant Green
87. Bromthymol Blue
88. Bromocresol Green
89. Bromcresol Purple
90. Cresol Red
91. Crystal Violet
92. Eosin Y
93. Giemsa Stain
94. Malachite Green
95. Methylene Blue
96. Methyl Red
97. Methyl Violet 2B
98. Naphthol Blue Black
99. Neutral Red
100. Phenol Red
101. Rhodamine B
102. Safranin O

103. TB Auramine-Rhodamine T
104. Thymol Blue
105. Thiazine Red
106. Tolupine Blue O
107. Wright's Stain
108. Wright-Giemsa Stain
109. Bacto Methyl Red
110. Calcium Hydroxide - toxic
111. Calcium Lactate
112. Charcoal
113. Cupric Sulfate
114. Coconut Oil - flammable
115. Cottonseed Oil - flammable
116. Magnesium Chloride - toxic
117. Polysorbate 80
118. Glycerin
119. Propylene Glycol - flammable and toxic
120. Polyethylene Glycol
121. Iso-propyl Alcohol
122. Safflower Oil - flammable
123. Sodium Thiosulfate - toxic
124. Sulfosalicylic Acid
125. Tannic Acid
126. Tartaric Acid
127. Thimersol
128. Teepol 610
129. Tween 20
130. Trichloracetic Acid
131. 2,3,5- Triphenyl-2H-Tetrazolium Chloride
132. Trisma, base
133. Trisma, HCl
134. L-Tyrosine
135. Bacto DNA Deoxyribonocleic Acid
136. Nalidixic Acid
137. Camplobacter Selective Supplement
138. Bacto-Lysozyme
139. DL-Histidine
140. Pyridoxine
141. Thiamine HCl
142. Riboflavin
143. Yersina Antibicrovic Supplement CN
144. Blue Dextran
145. p-Aminodimehtylaniline Oxalate
146. H2S Test Strips
147. Trypsin 1:250
148. Stabilized Phenol Solution (0.005%)
149. Differentiation Disks, Salicin
150. Differentiation Disks, Dulcitol
151. Differentiation Disks, Rhamnose
152. Differentiation Disks, Dextrose
153. Lead Acetate Strips
154. Urea Agar Base Concentrate
155. Oxoid Diagnostic Reagents, Set-RPLA
156. Gas Pak Anaerobic Indicators

157. Penicillin Disks
158. Staph Anti-serum
159. Staph Enterotoxin
160. Botulinum Toxoid
161. Clostridium Botulinum
162. Campylobacter growth supplement
163. Alcohol Amyl Iso
164. Thaiazine Red
165. Zinc, Granular
166. 3.5% Ninhydrin (API 20s)
167. Cinnamaldehyde Reagent (API 20s)
168. Potassium Hydroxide 40% (API 20s)
169. Kovac's Reagent (API 20s)
170. Alpha-naphthol 0.8 g (API 20s)
171. Sulfanilic Acid 0.8% (API 20s)
172. N,N-dimethyl Alpha-Naphthylamine (0.5%) (API 20s)
173. Ferric Chloride 10% (API 20s)
174. EY Tellurite Enrichment
175. Selinite Cystine Broth
176. D(-) Arabinose
177. D(+) Cellobiose
178. Casamino Acids
179. 1-Inositol
180. Ehrilich's Reagent (API 20s)
181. Xylene (API 20s)

METHOD OF DISPOSAL: Removed by contract personnel.

APPENDIX L:

PHOTOGRAPHS OF PSF


1


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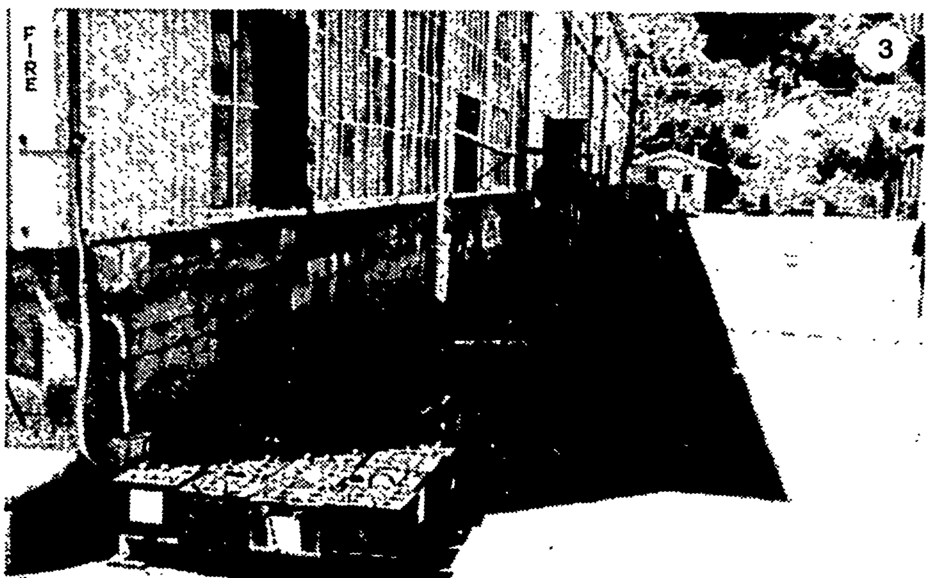
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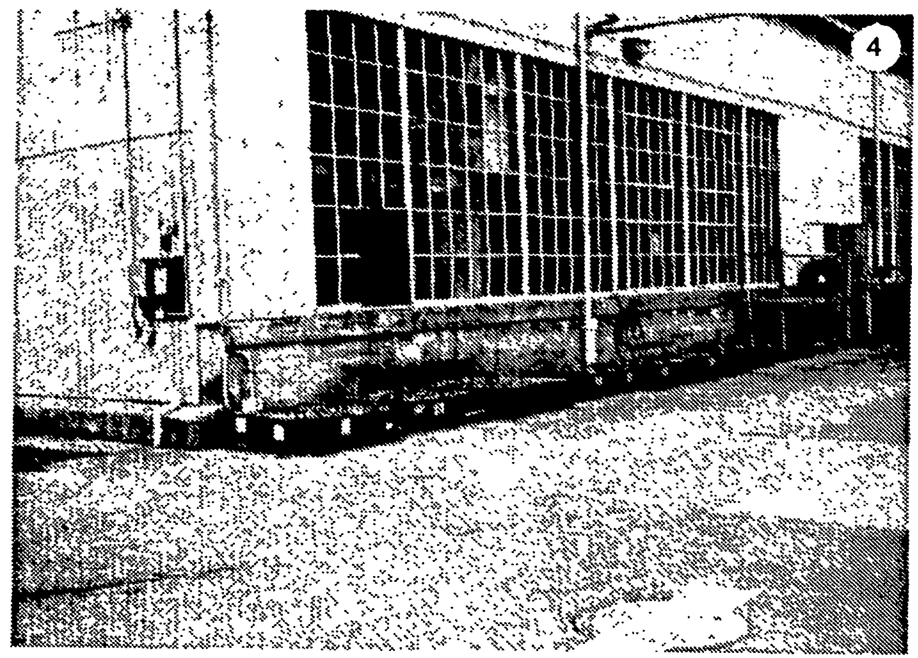
FIRE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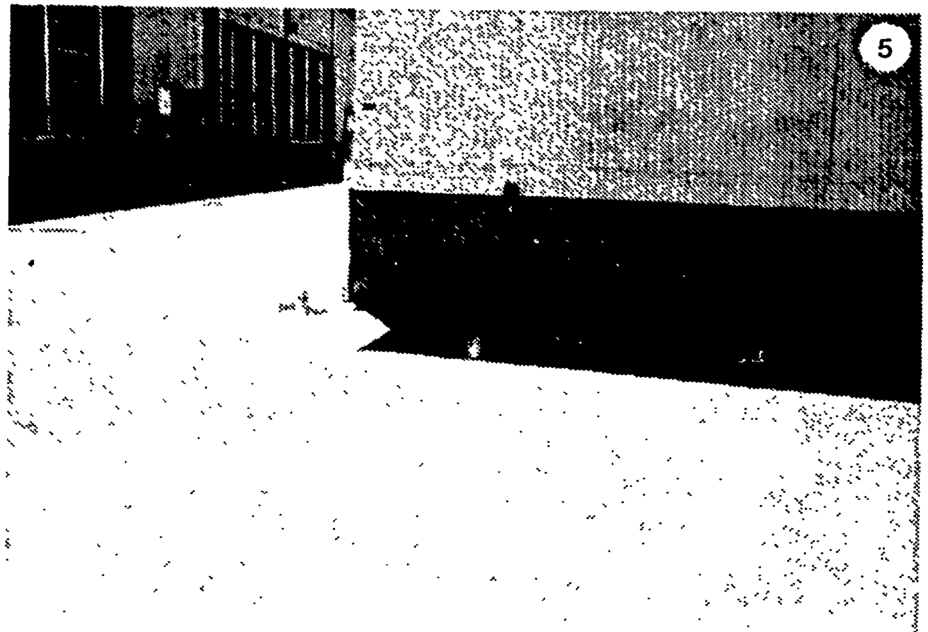
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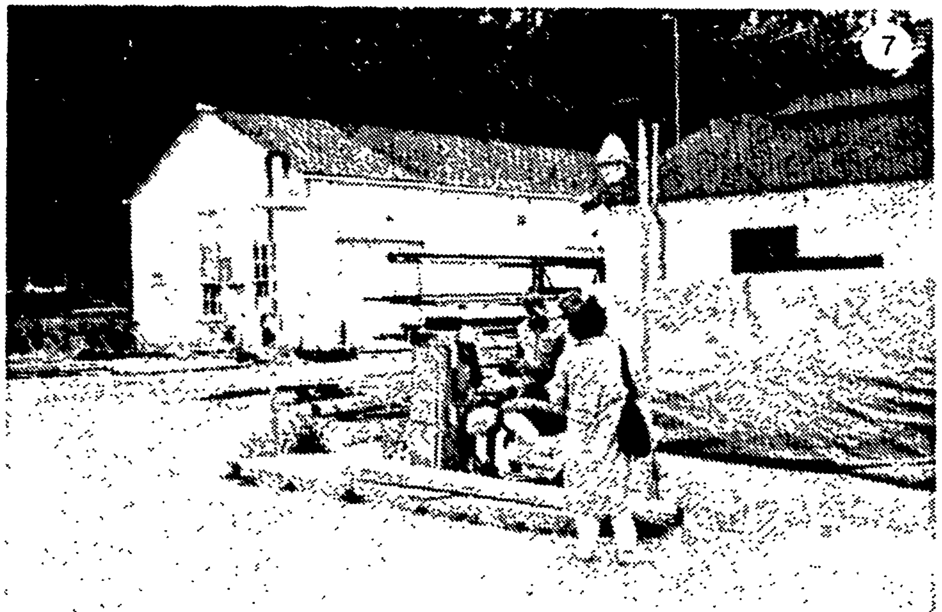
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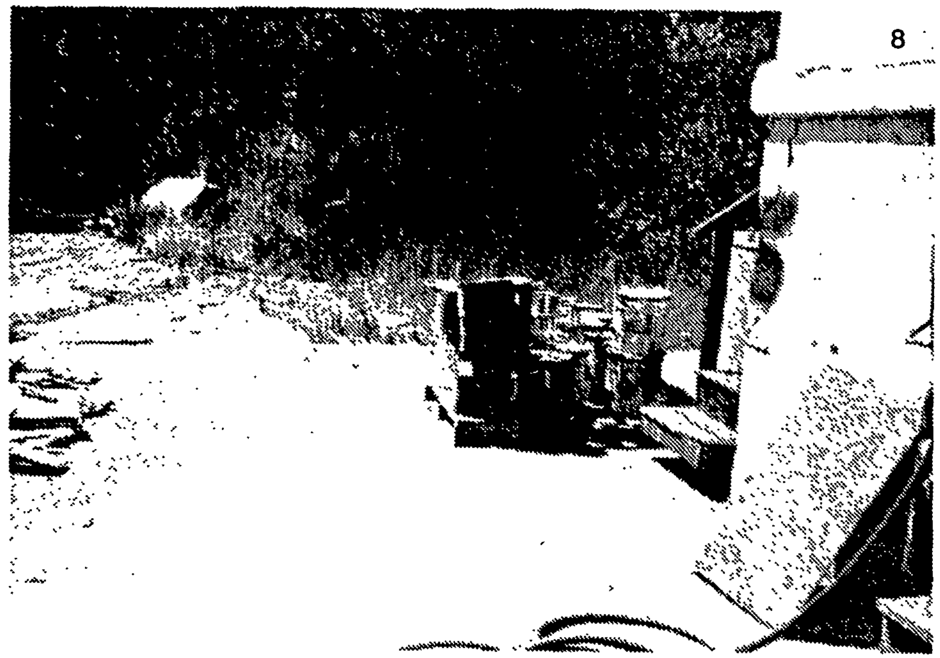
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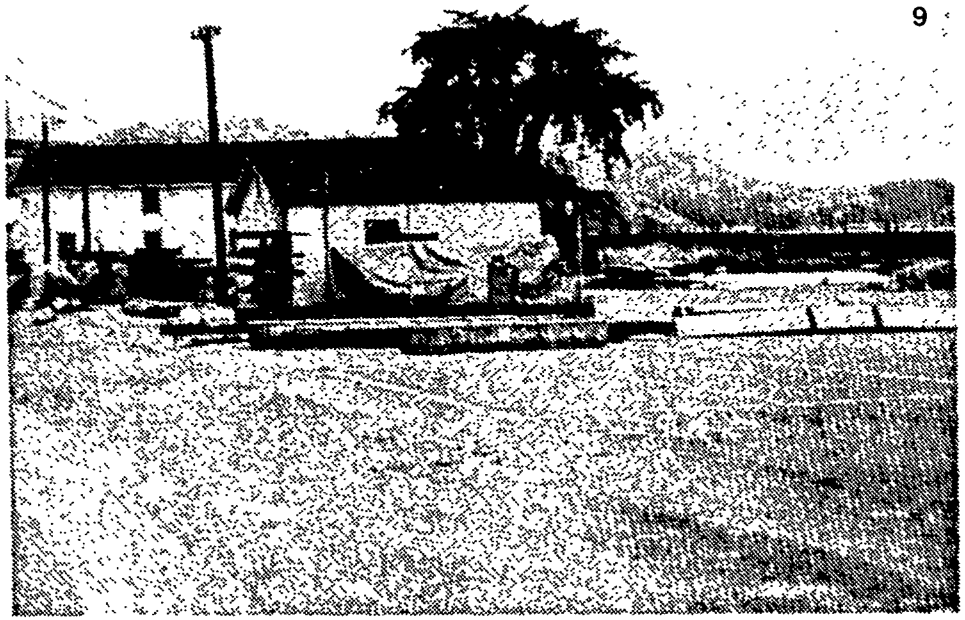

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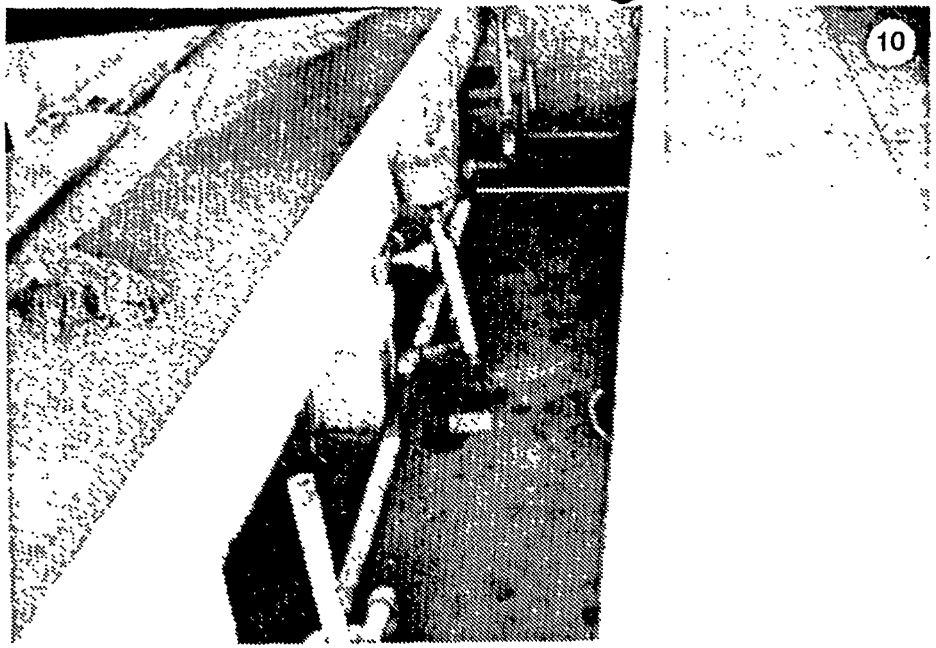

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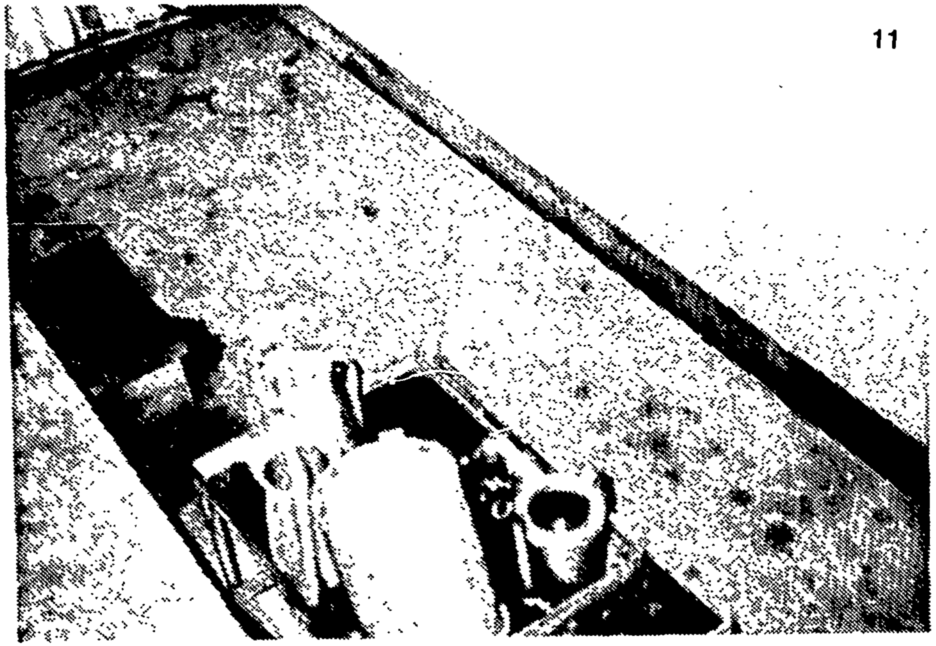

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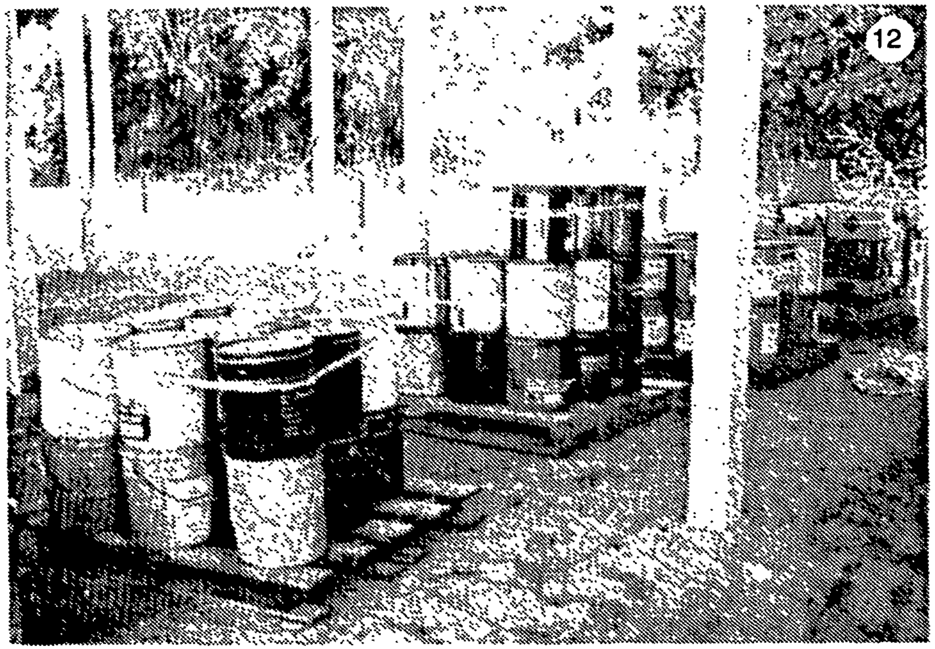

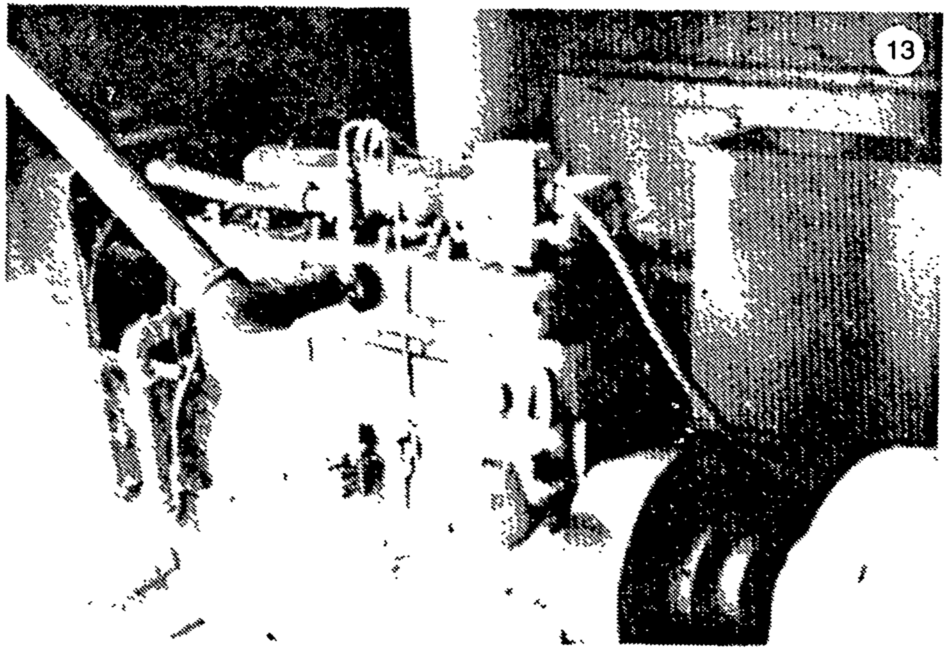
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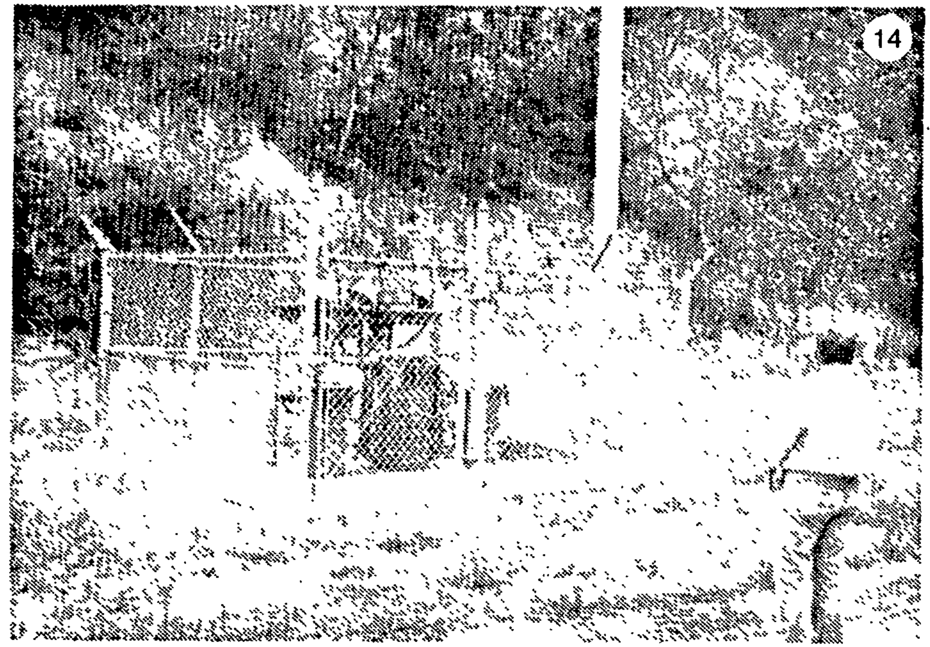
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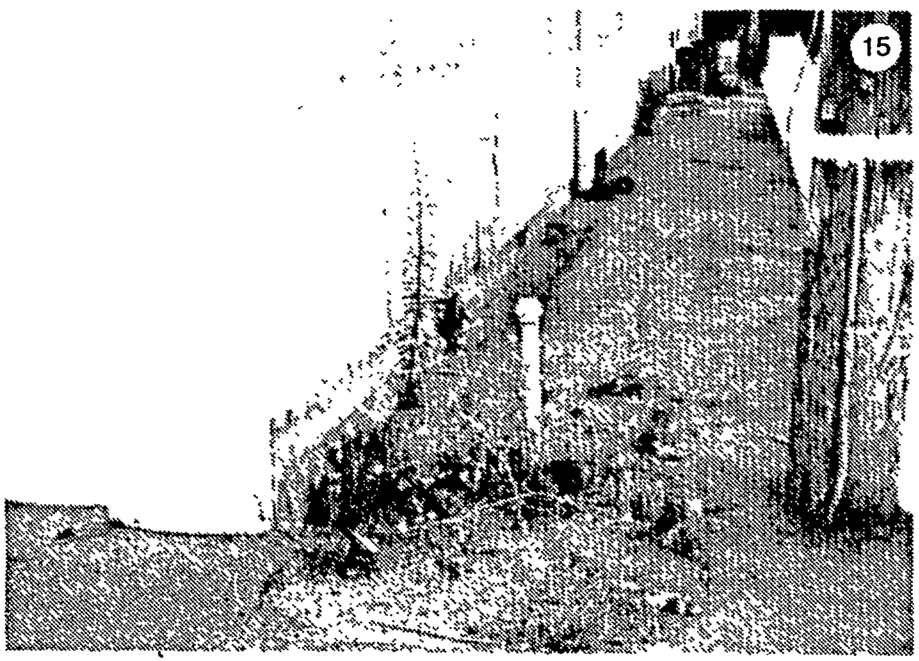
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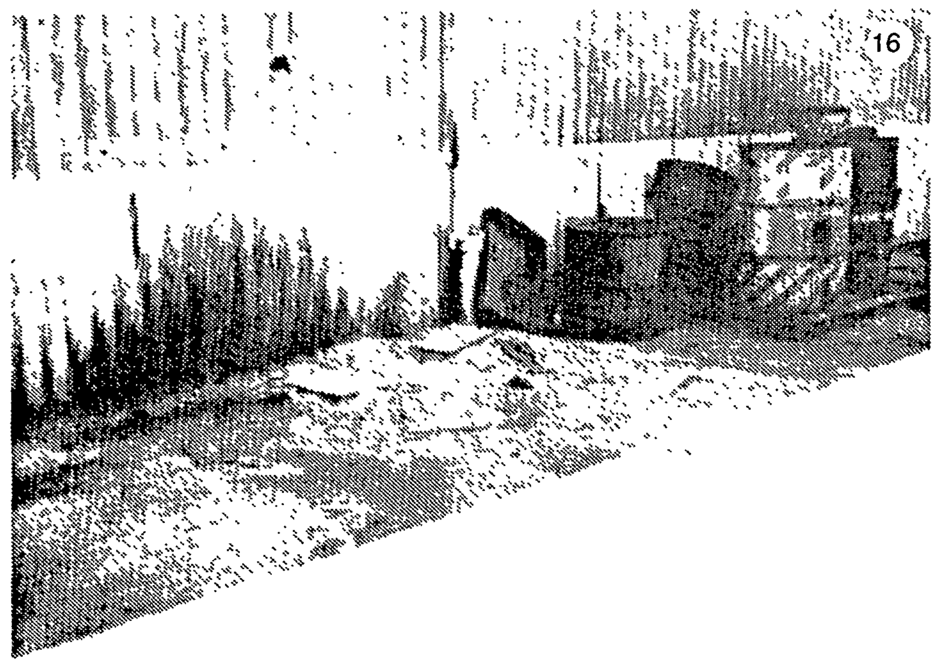
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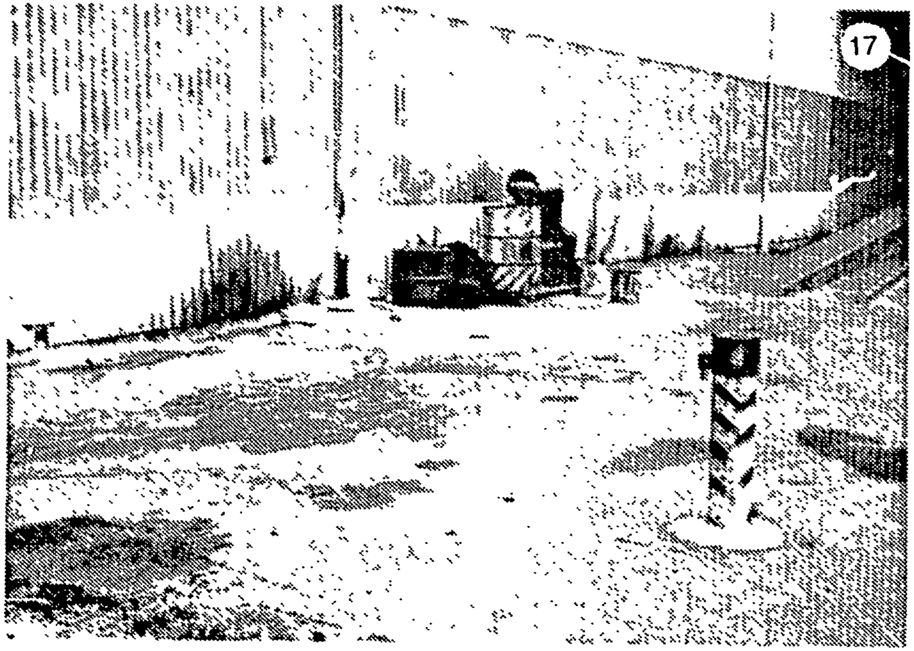

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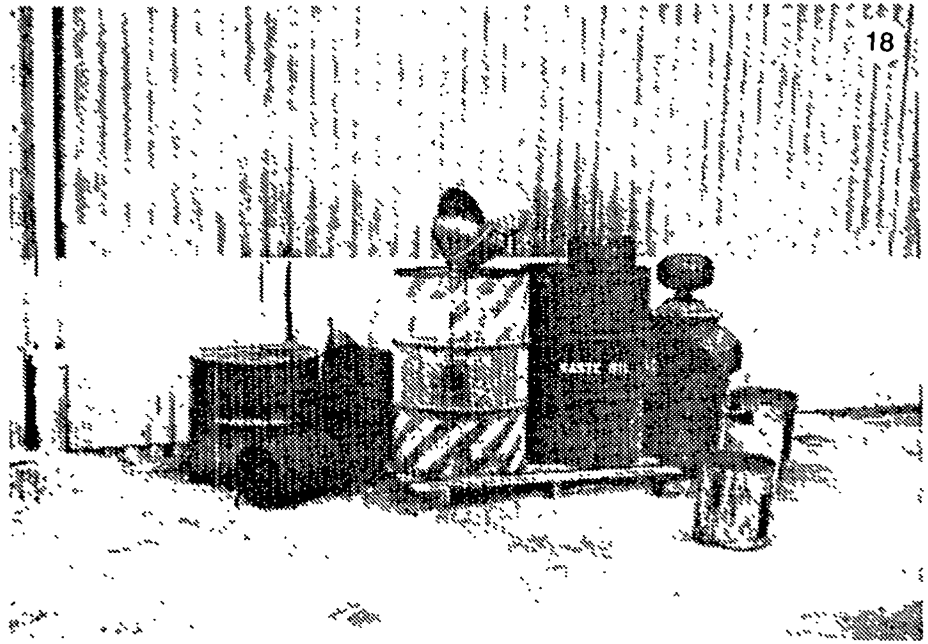

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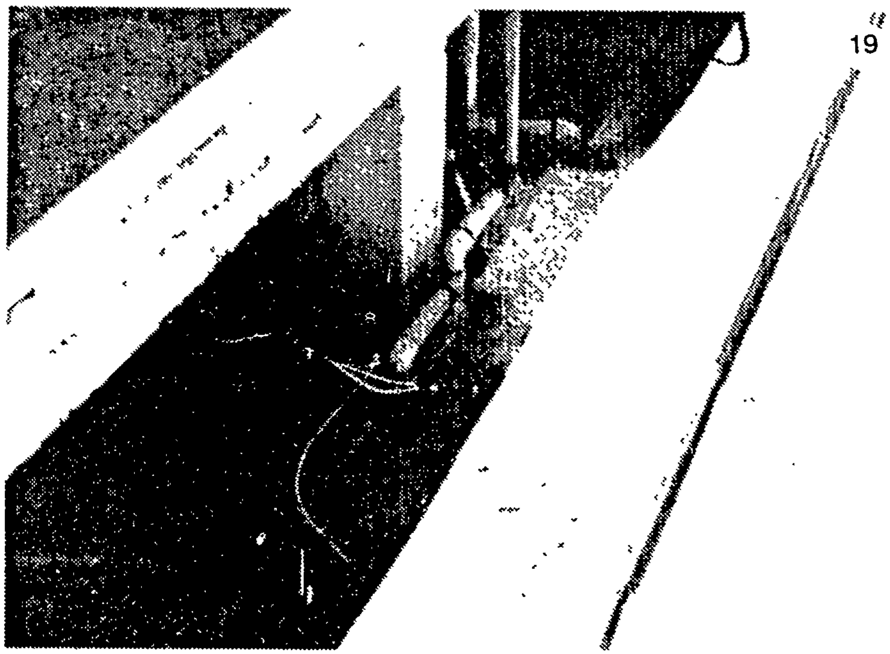

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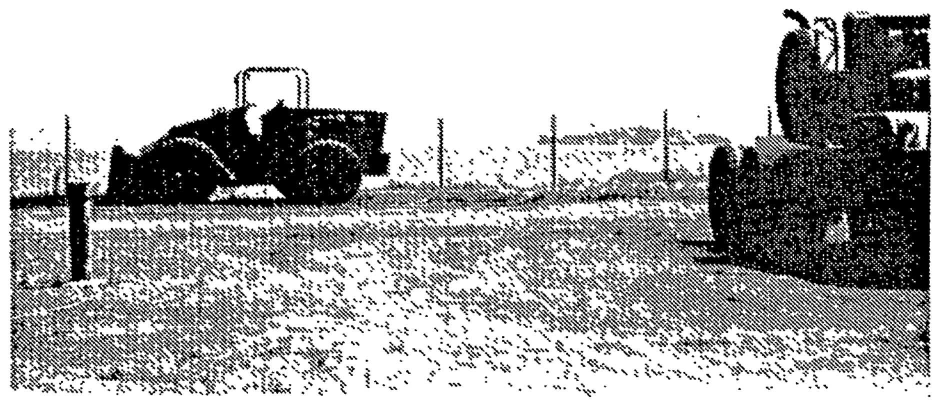

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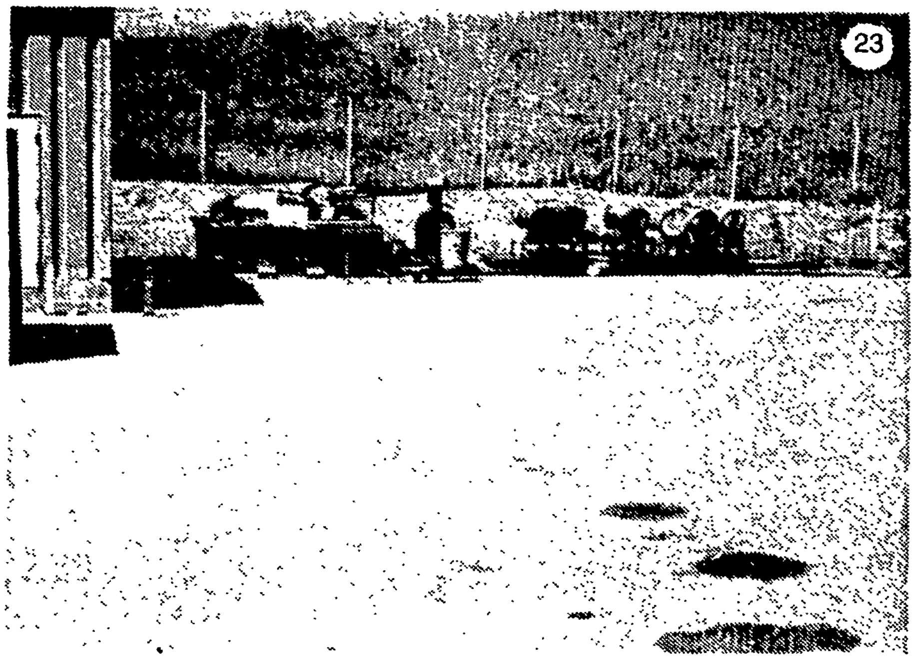
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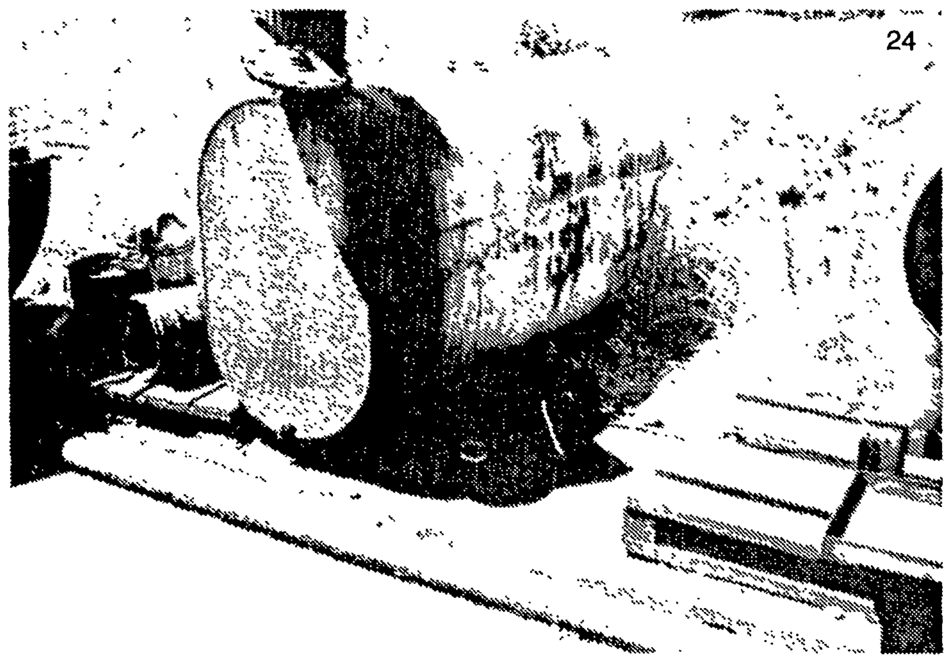
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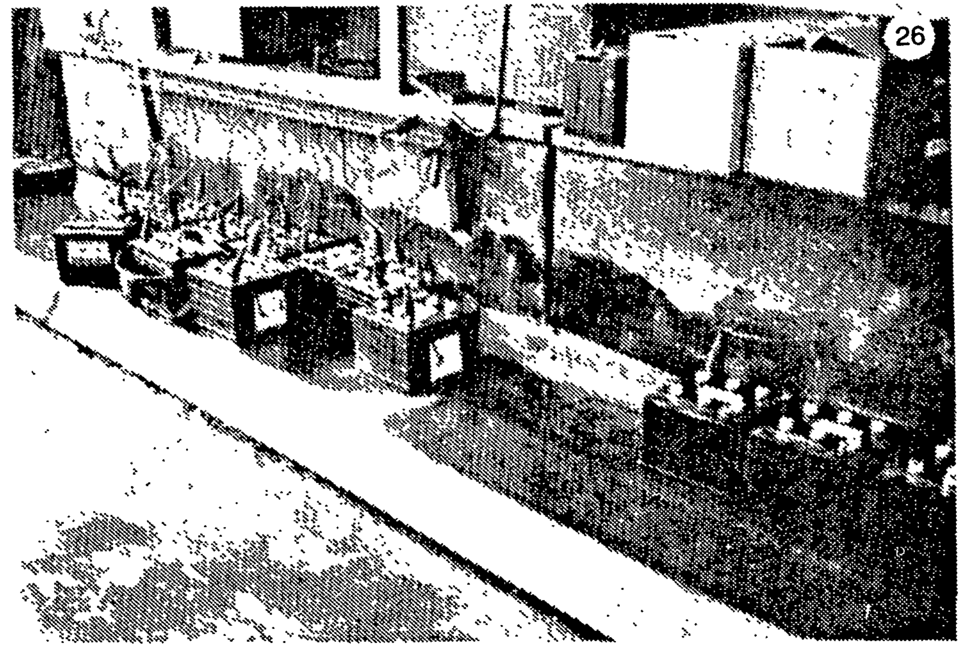
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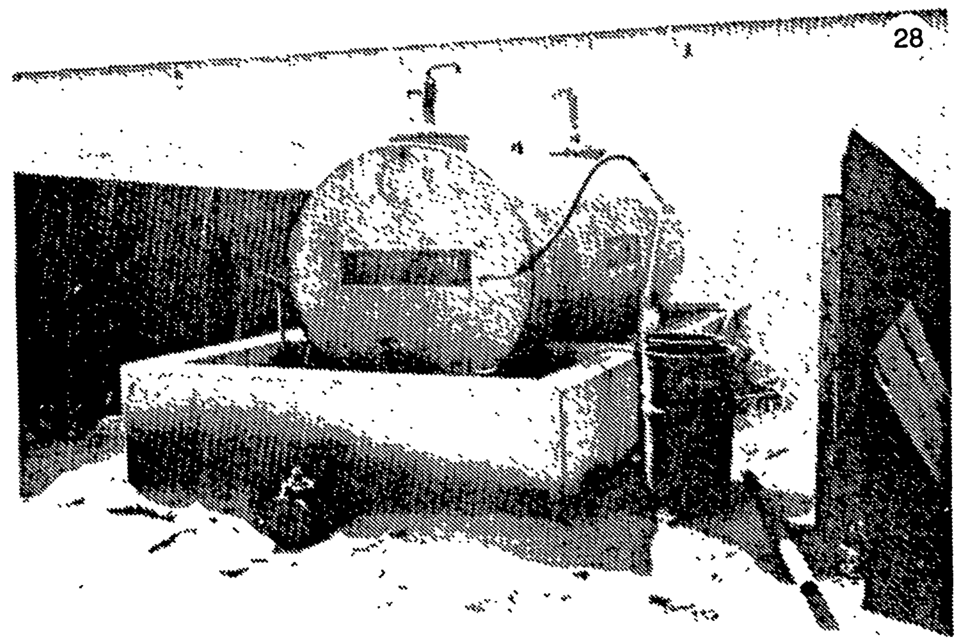
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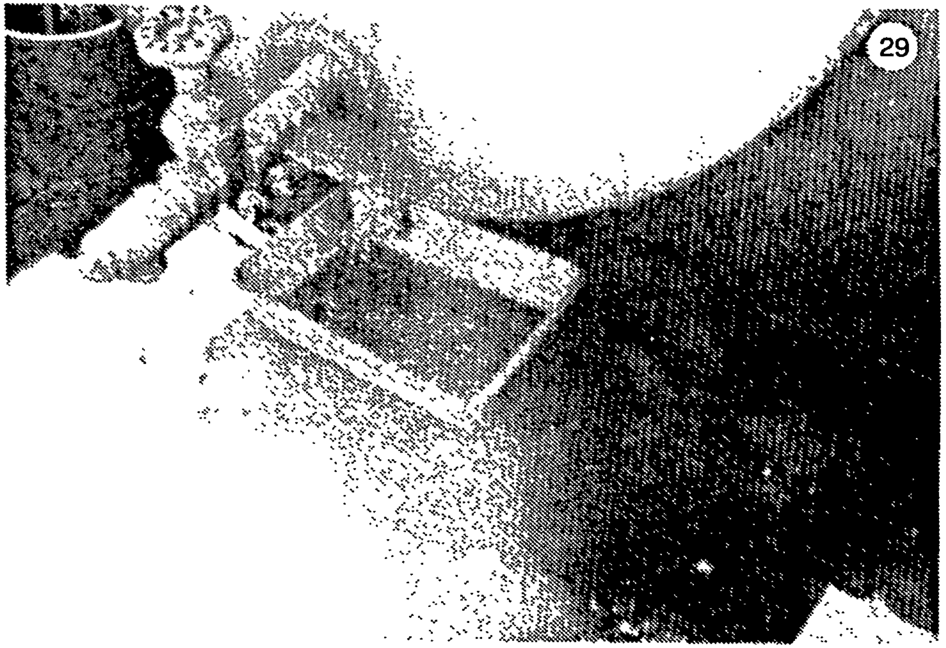
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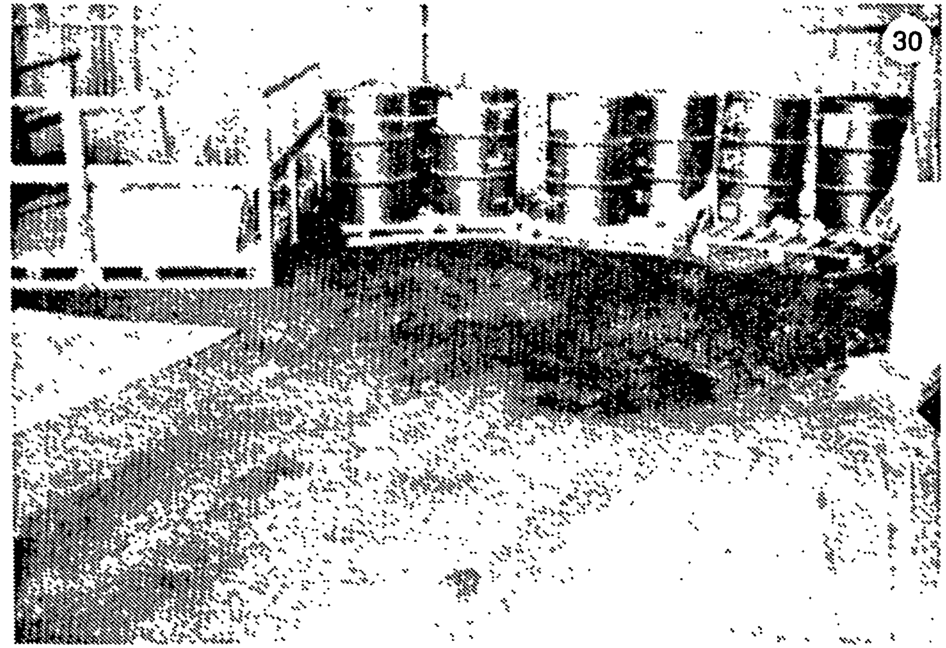
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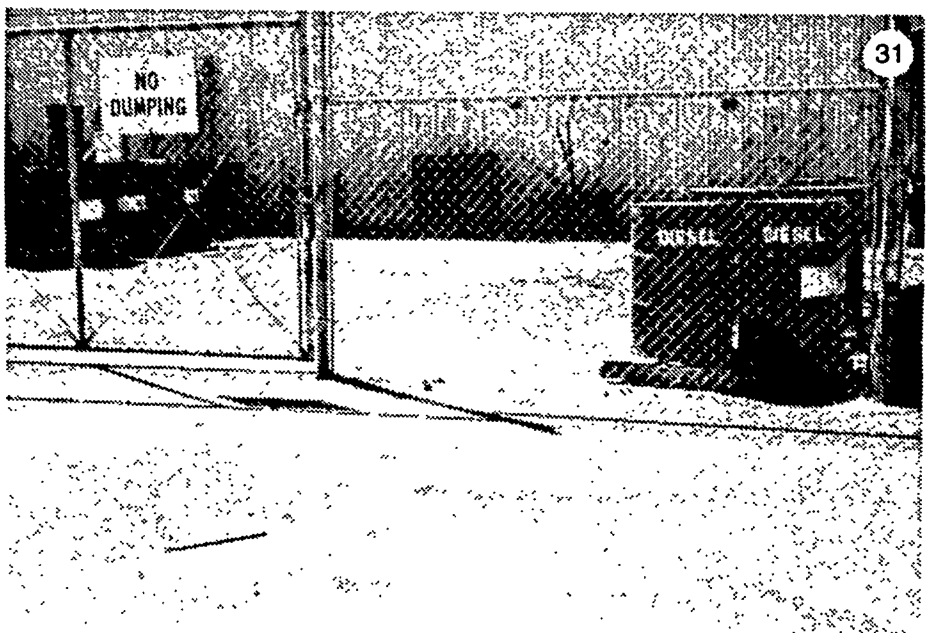
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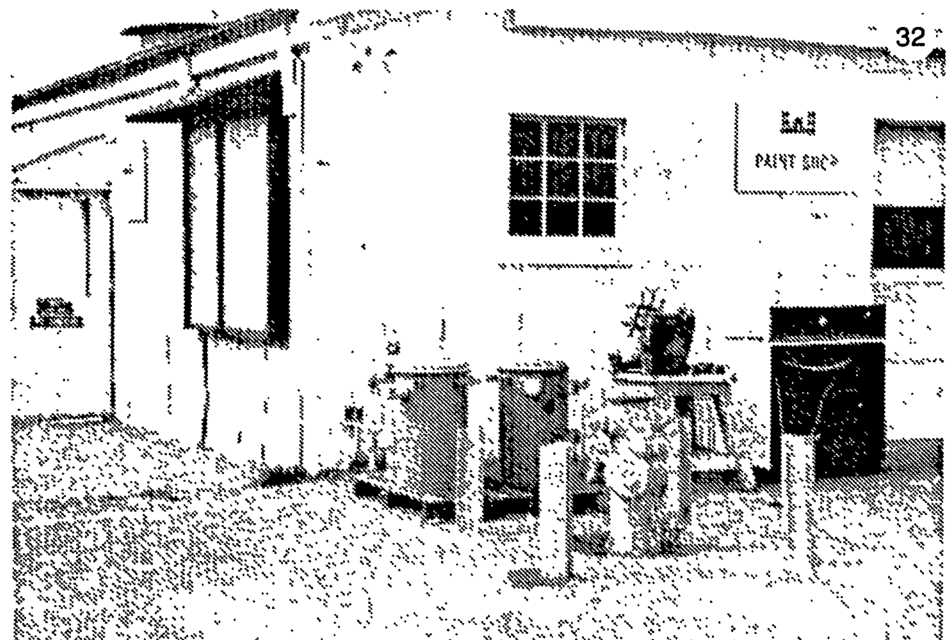
NO DUMPING
DIESEL
DIESEL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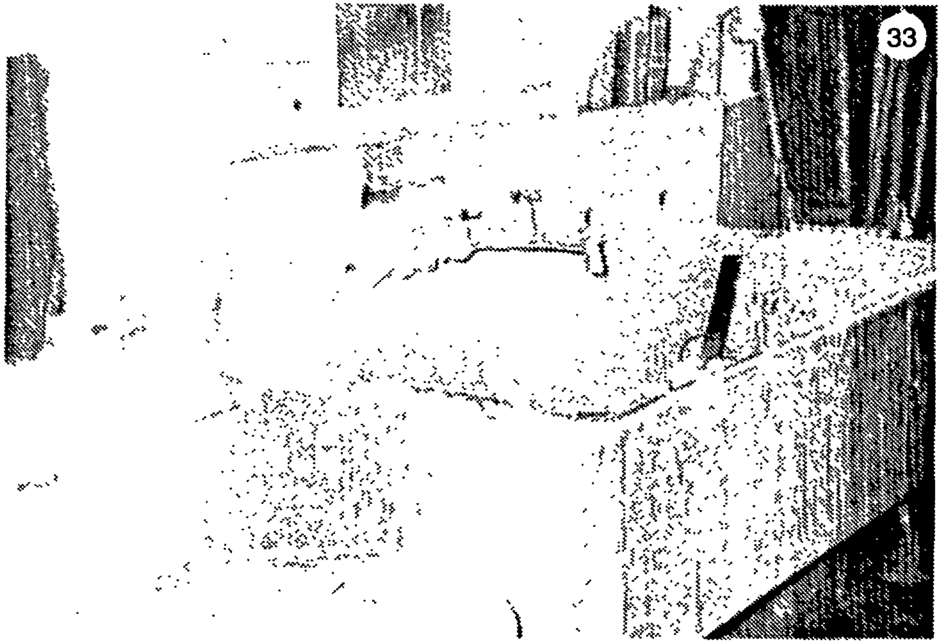
PAINT SHOP



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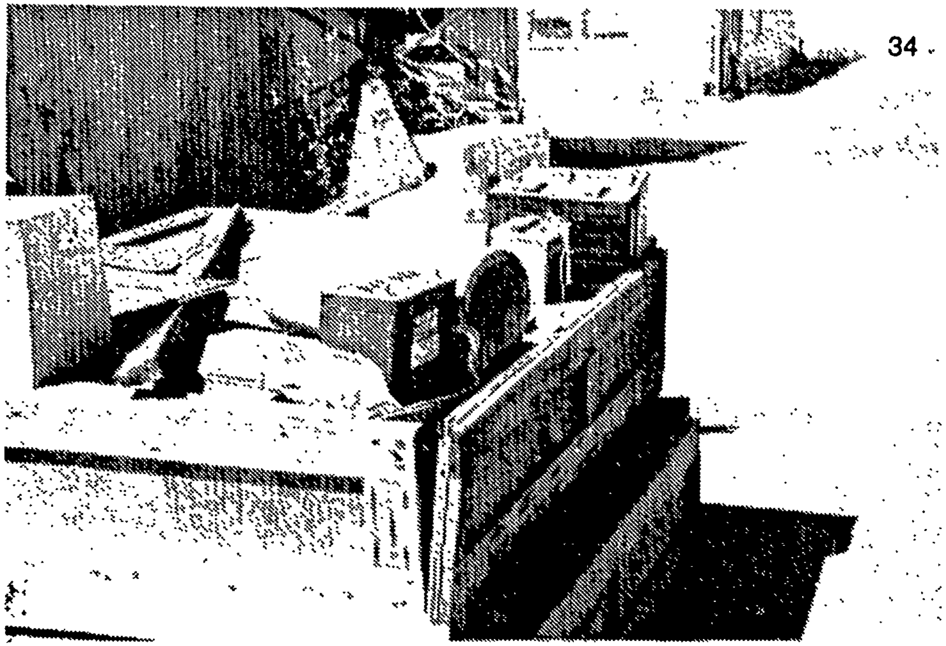

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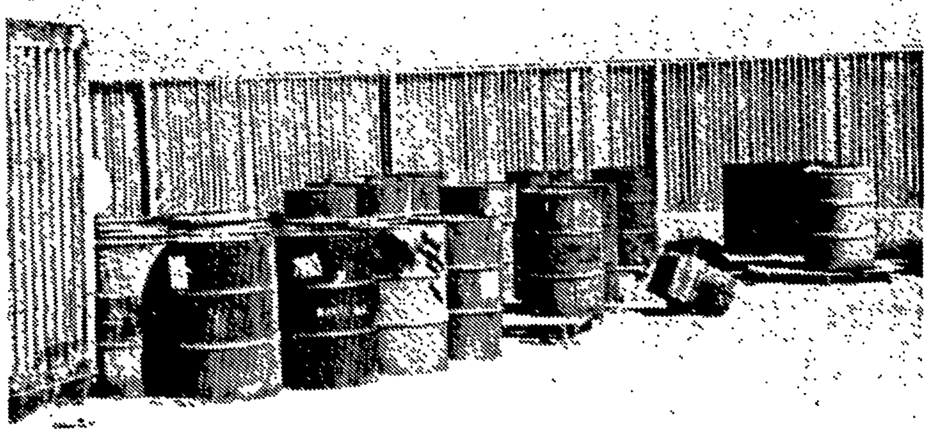

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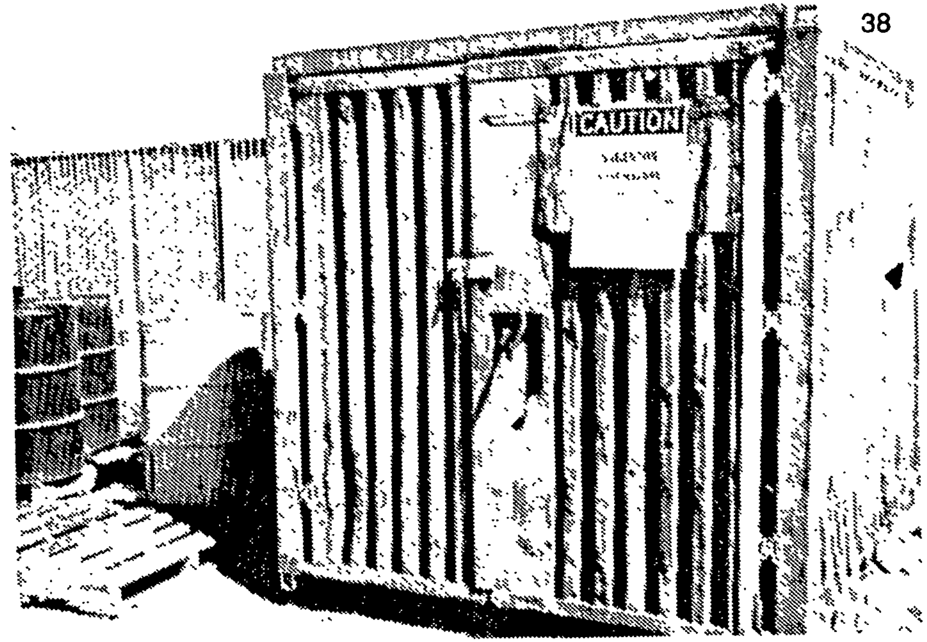

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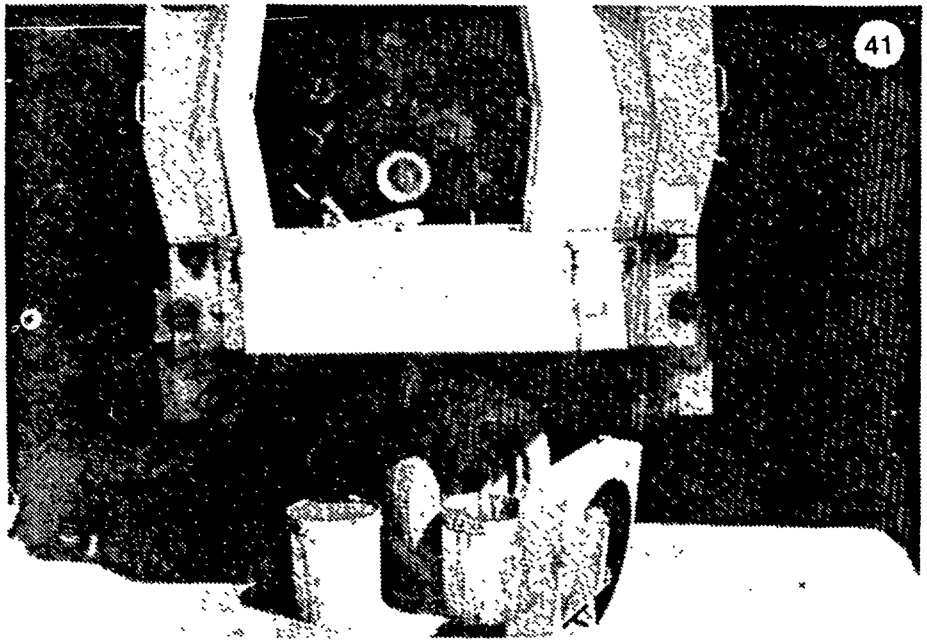
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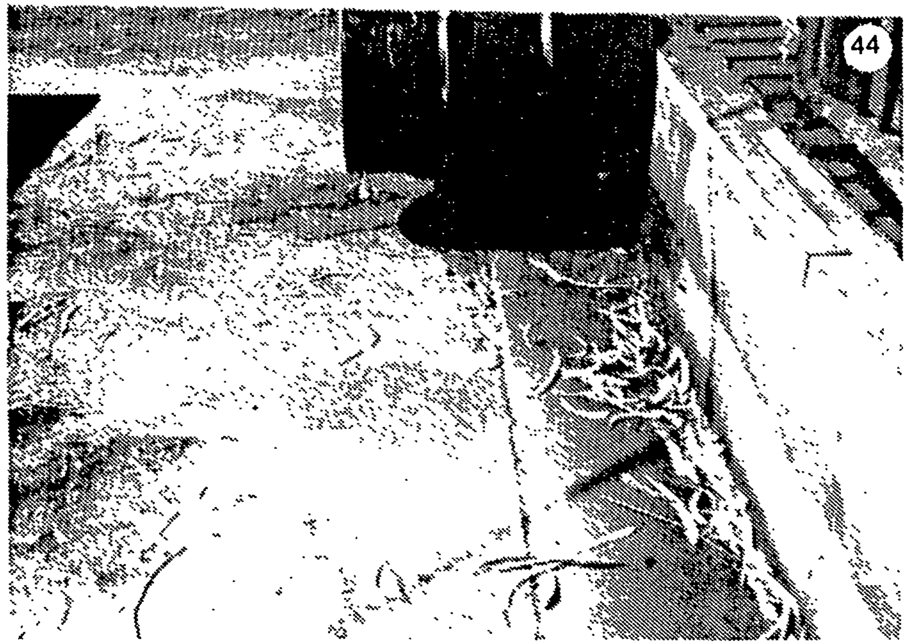
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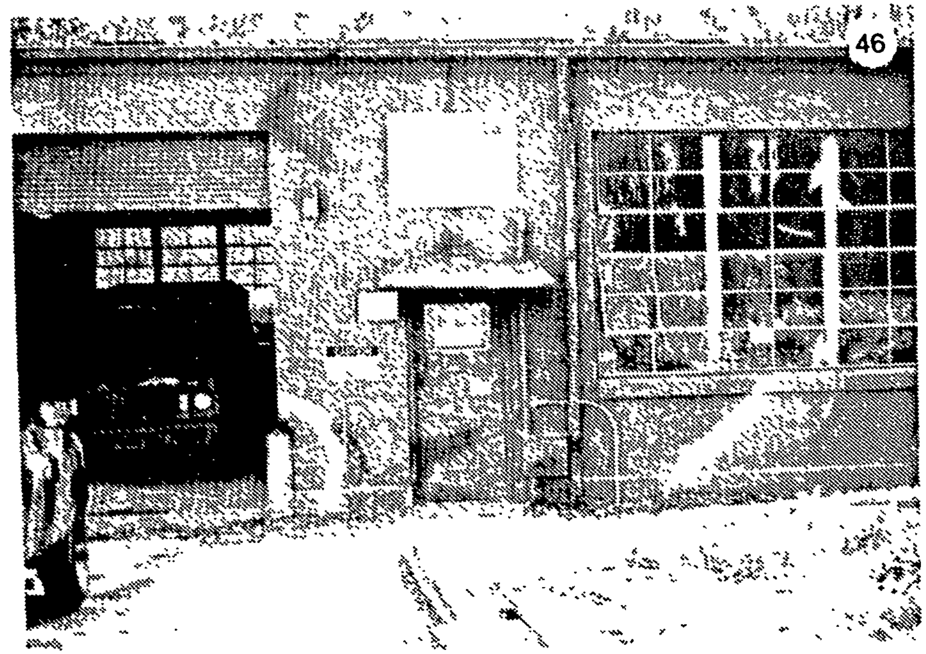
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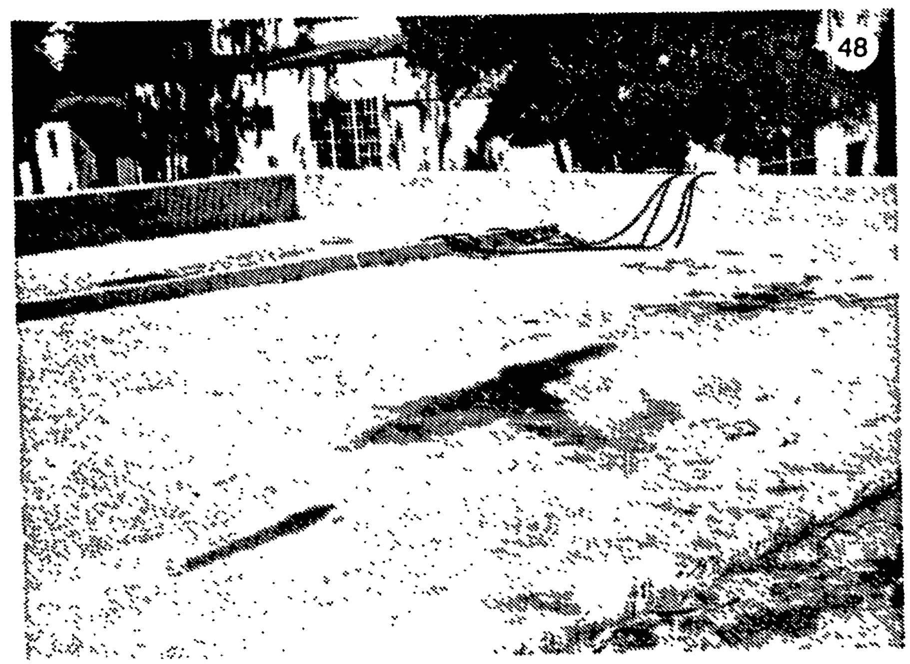
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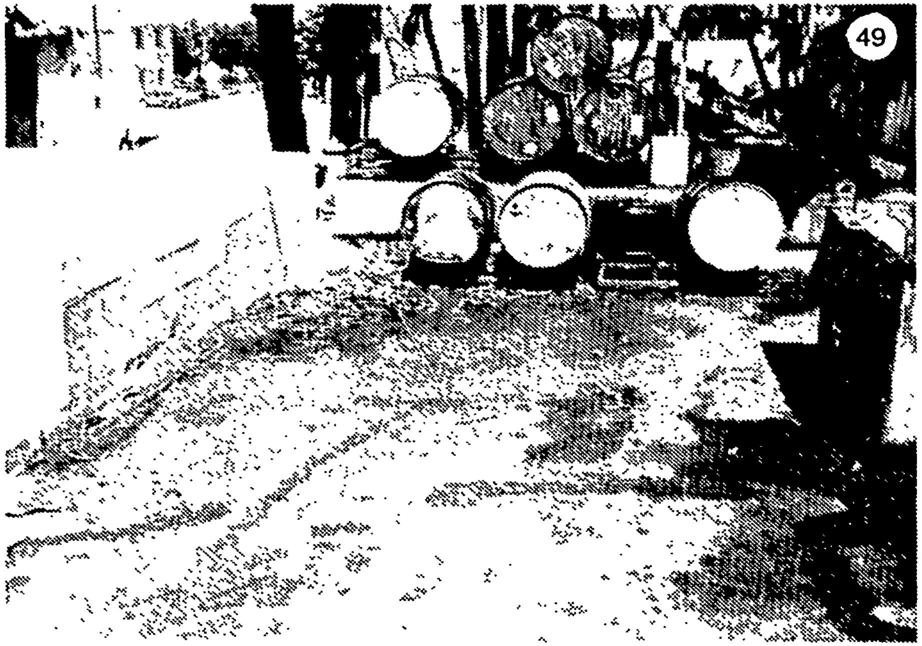

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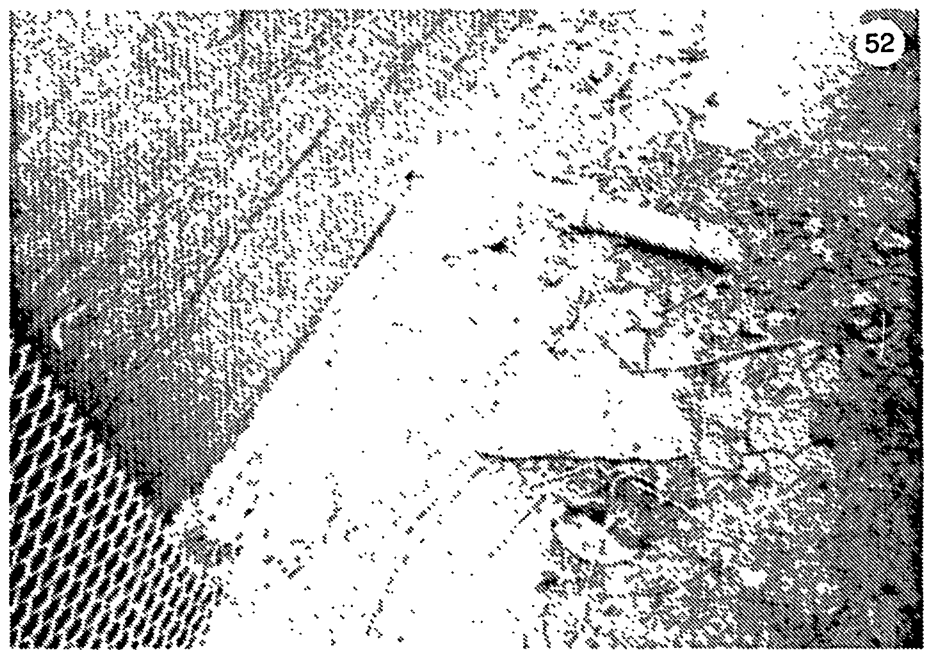

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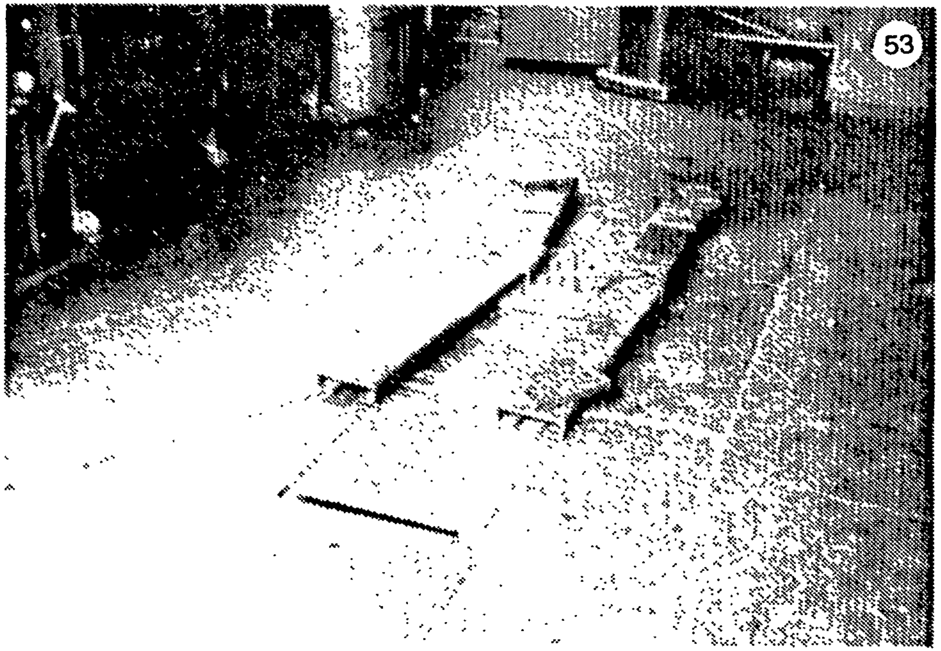
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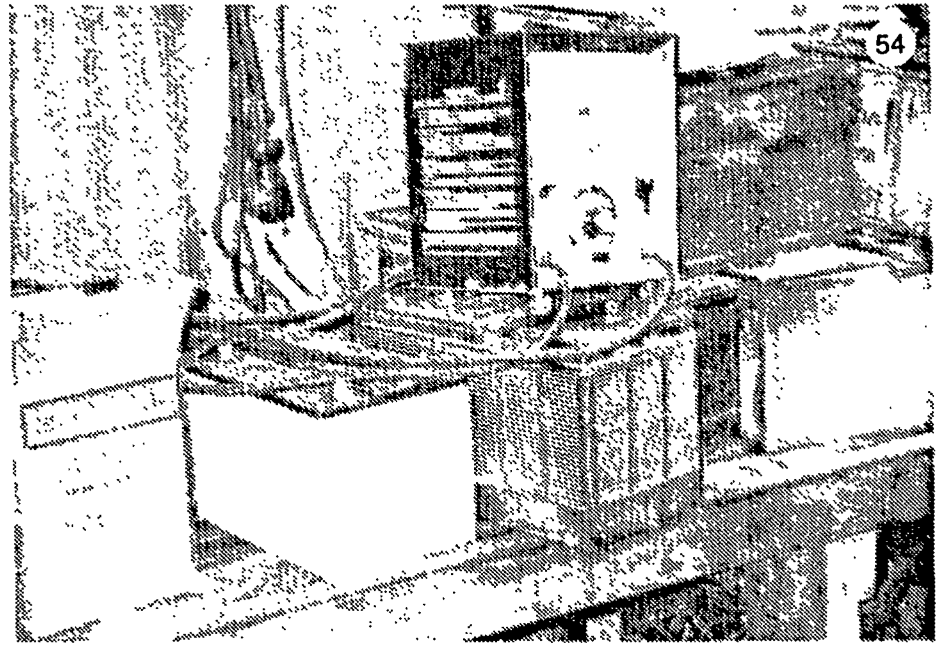
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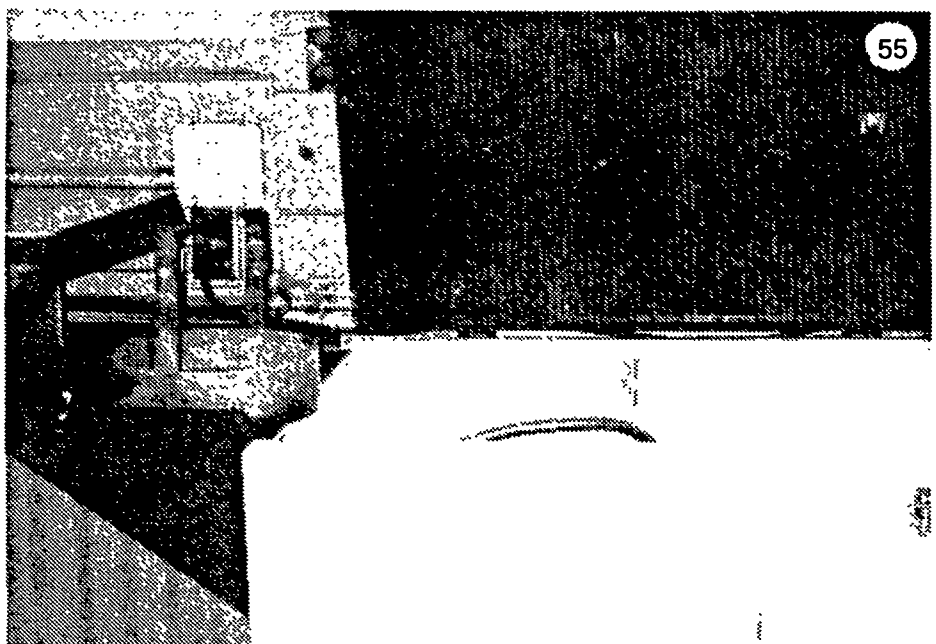
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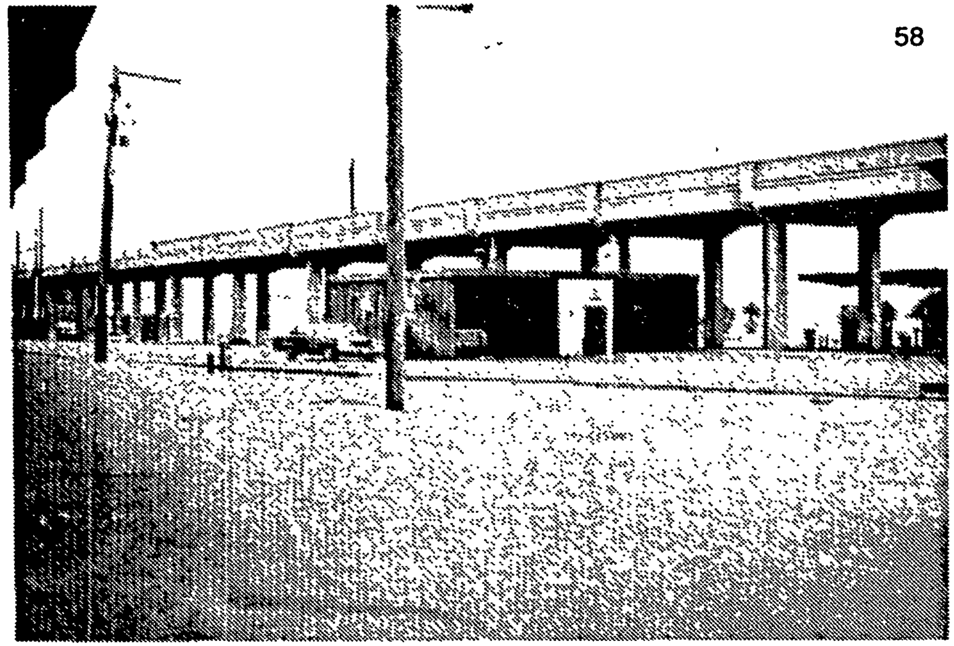
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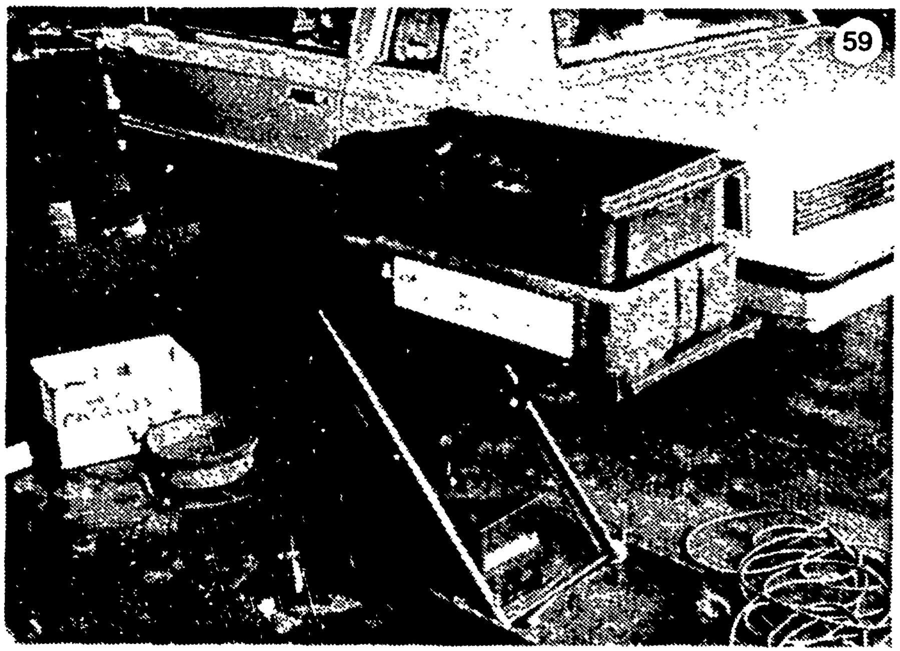
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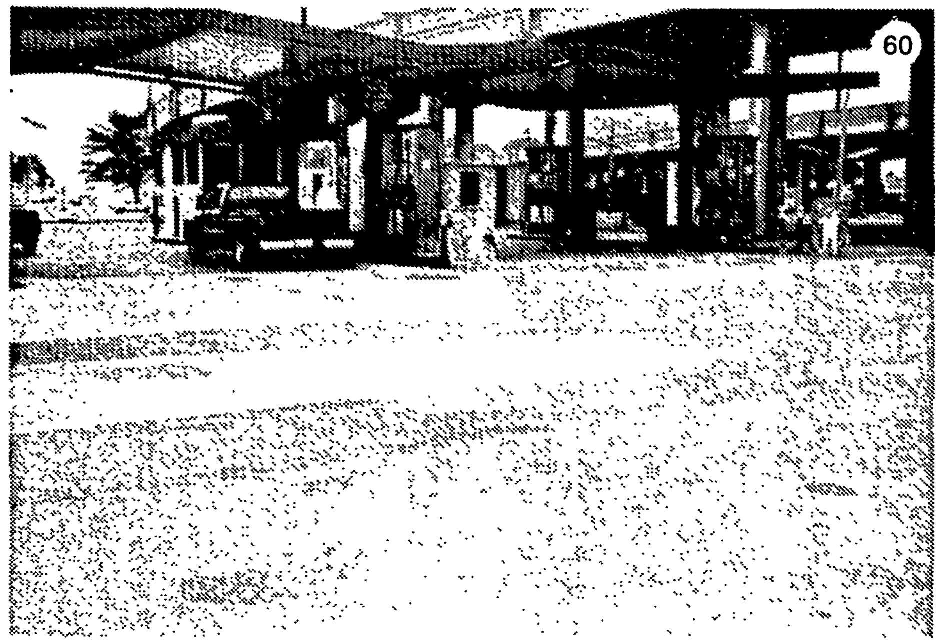
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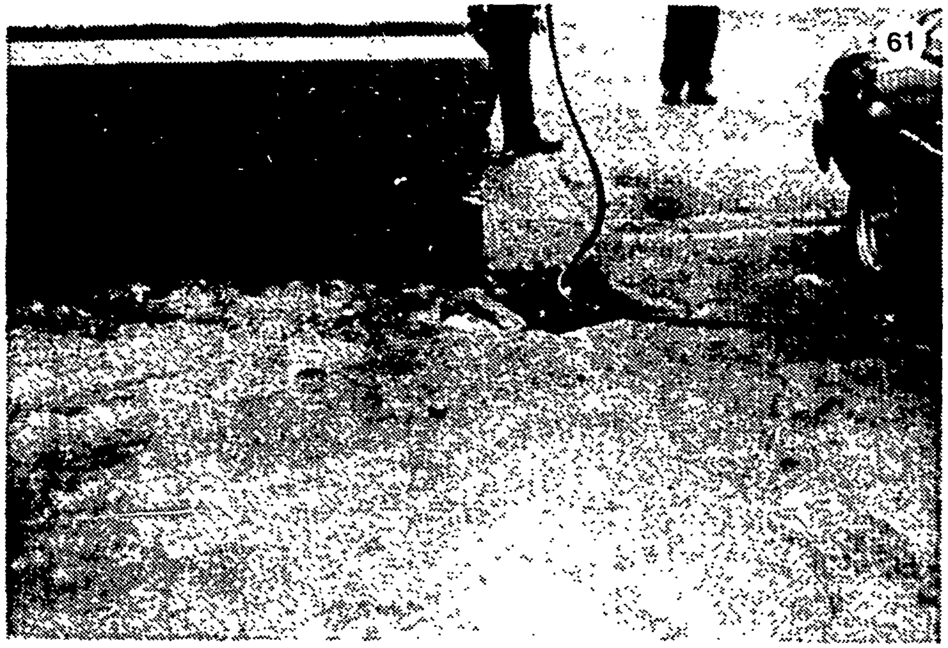
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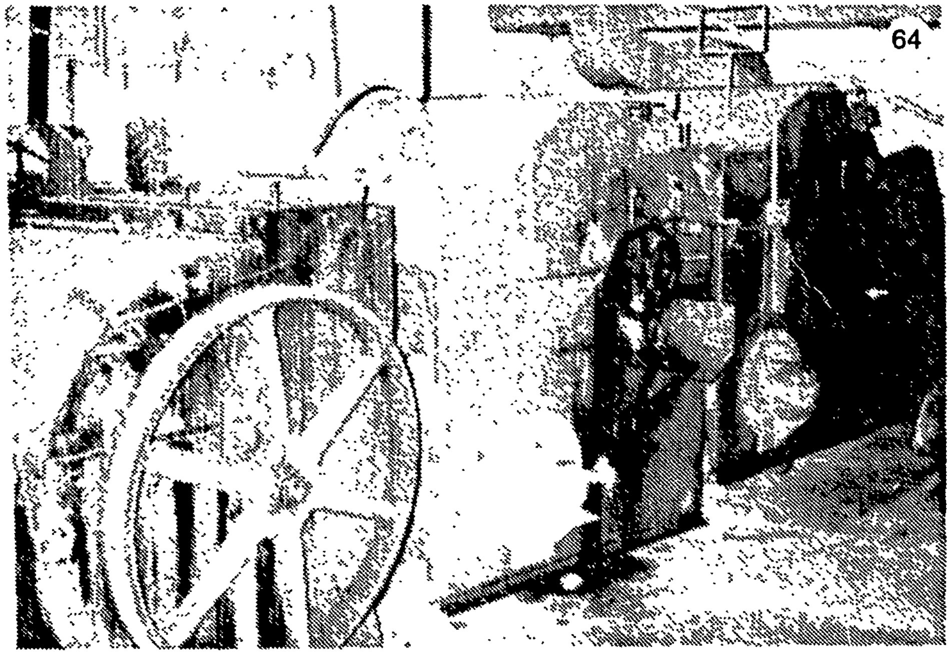
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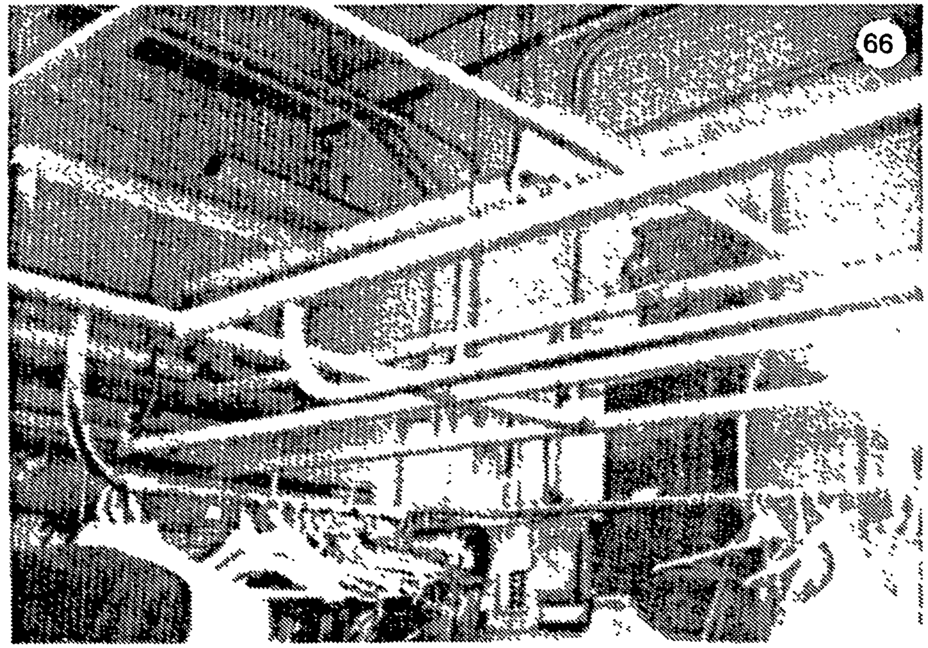
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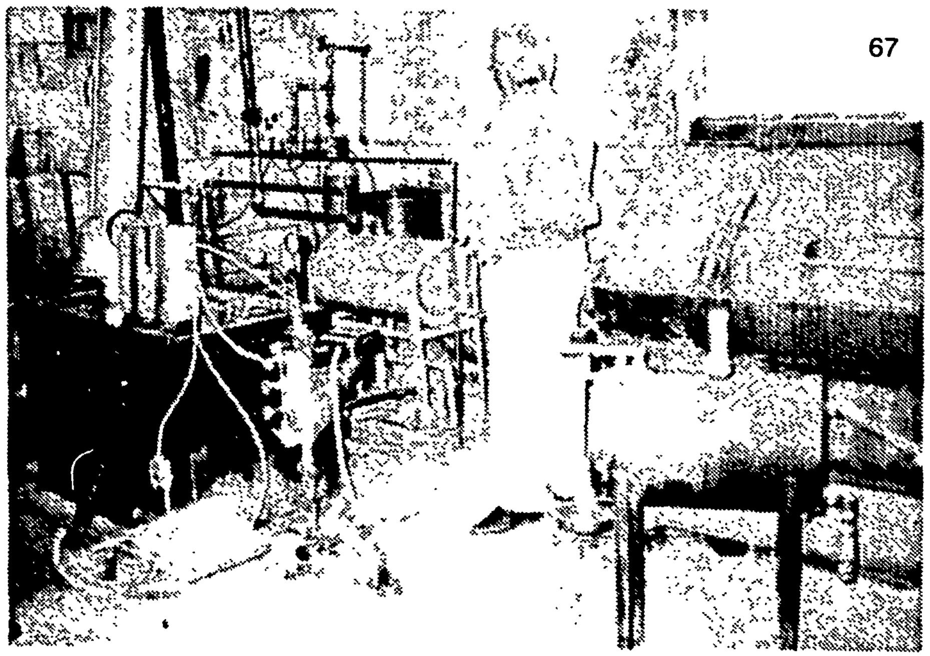
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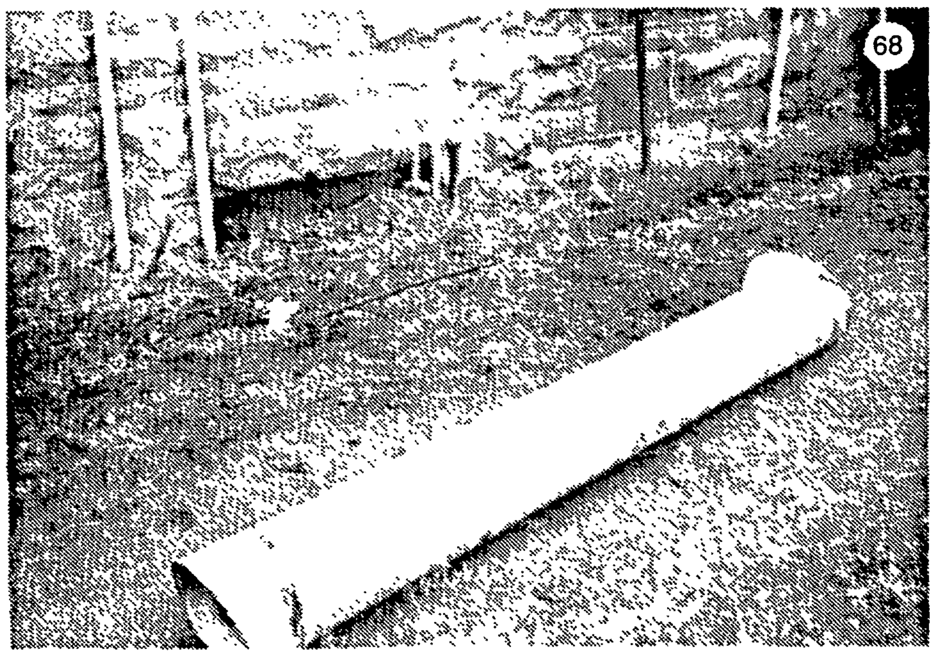
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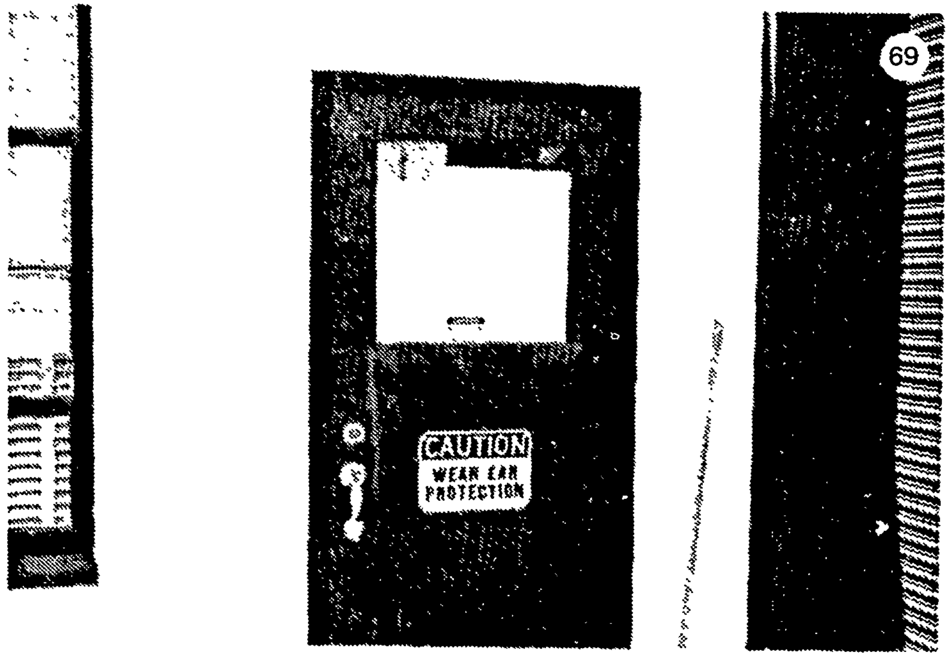
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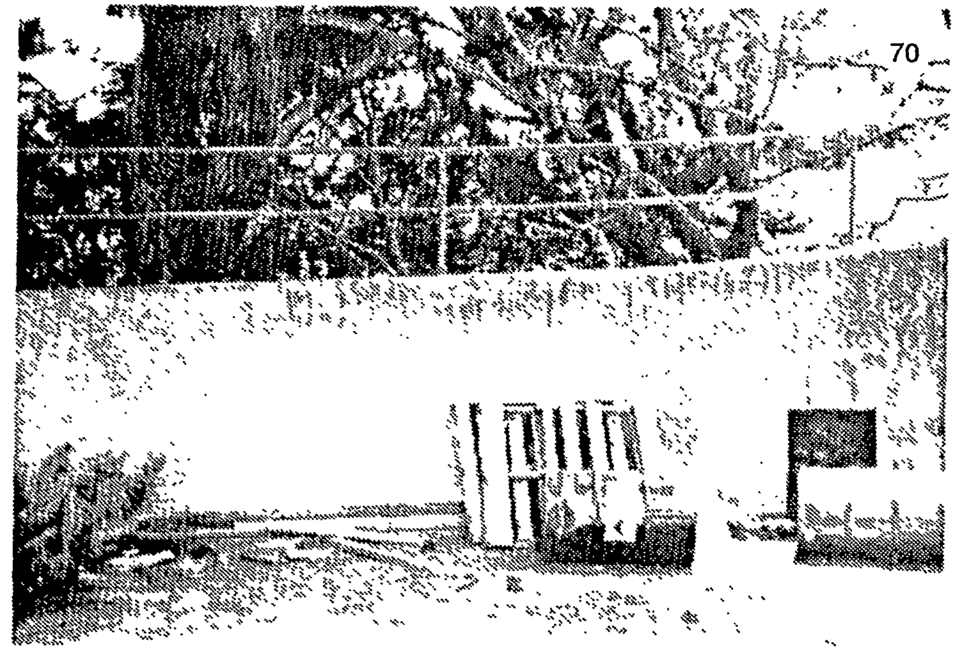
CAUTION
WEAR EAR
PROTECTION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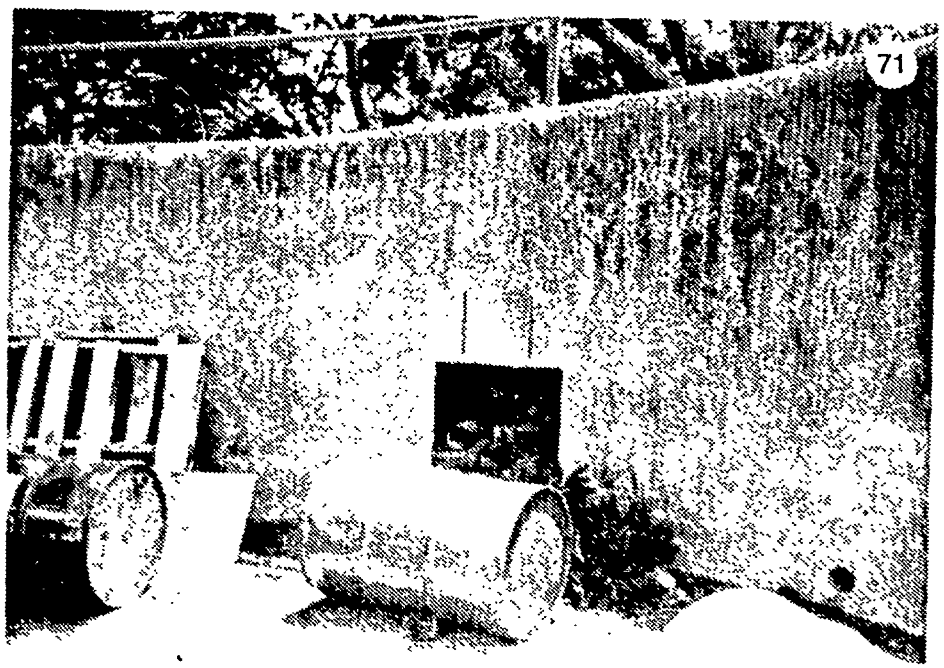
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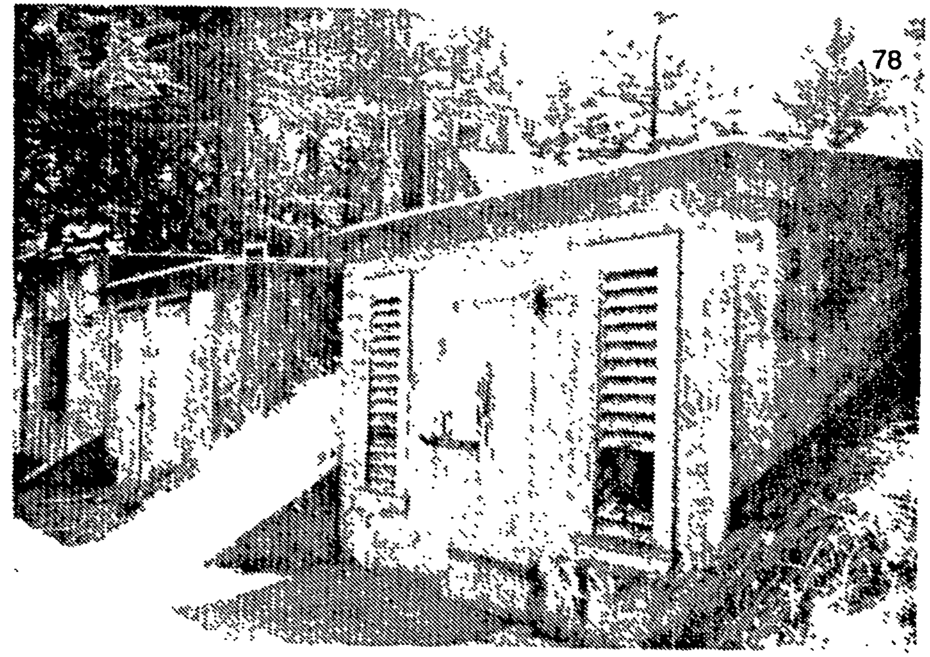
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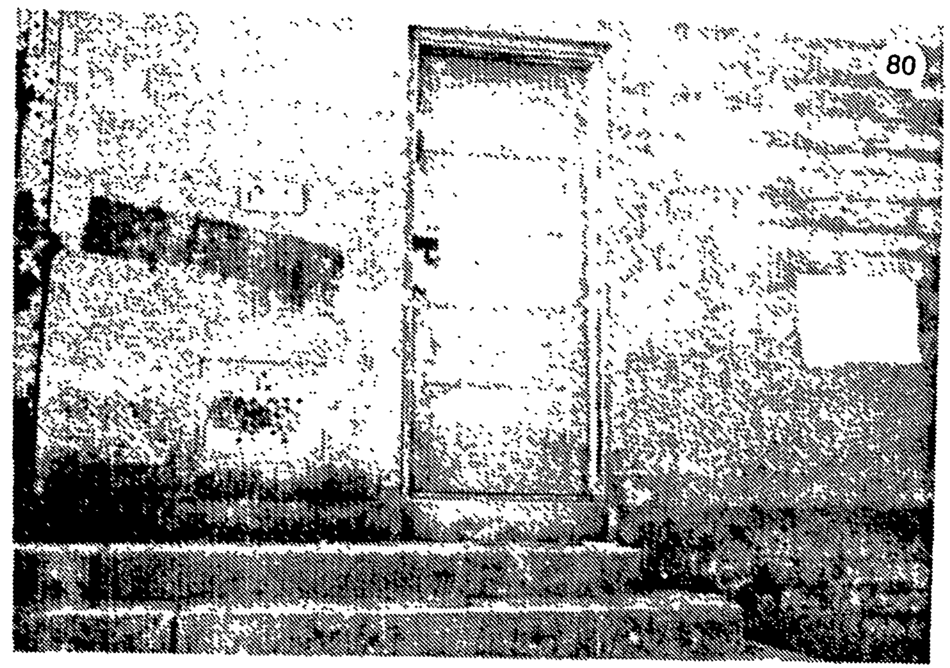
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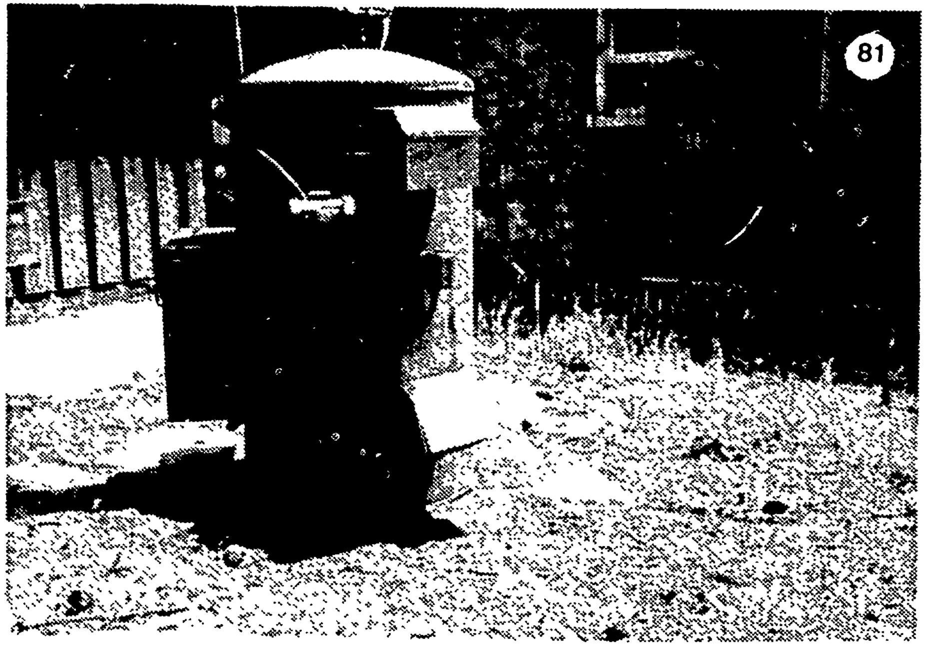

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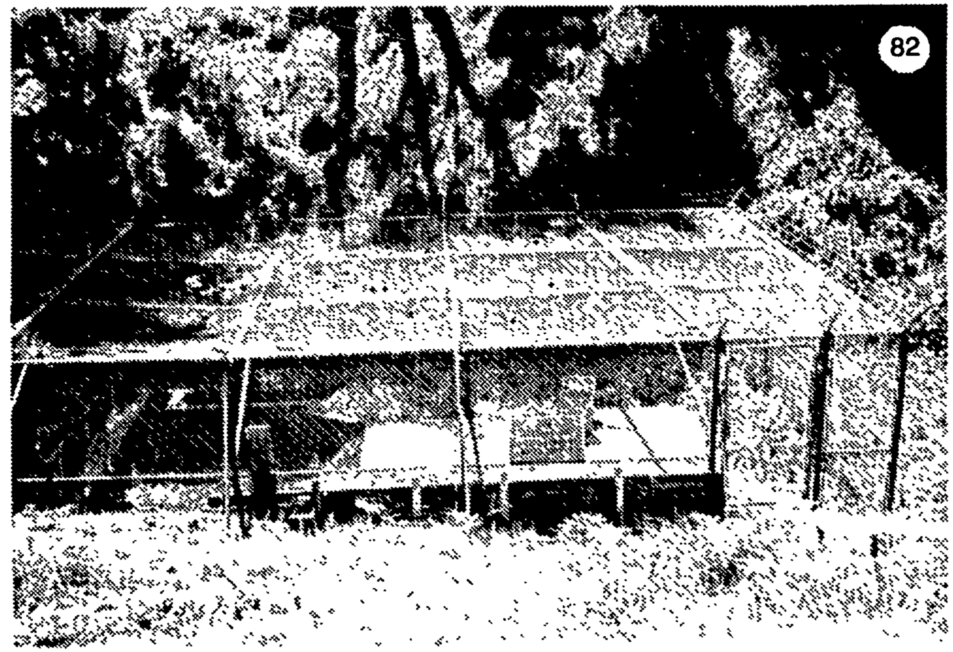

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IDENTIFICATIONS OF PHOTOGRAPHS

Crissy Field Area

1. Wash rack near Bldg. 930.

2. POL storage near Bldg. 931.

3. Battery storage at Bldg 926.

4. Battery storage at Bldg. 926.

5. Groundwater monitor well near Bldg. 934.

6. POL storage area, Bldg. 950.

7. Abandoned gasoline pumps near Bldg. 976.

8. POL storage near Bldg 929.

9. Site of abandoned gas station near Bldg. 976, area is now a DEH storage yard.

10. Vehicle inspection ramps north of Bldg. 937; plumbing leads to waste-oil UST.

11. Oil cans and open containers at vehicle inspection ramp at north of Bldg. 937.

12. POL storage in Bldg. 973.

13. Diesel engine, inside Bldg. 929, converted for use as an air compressor.

14. Electrical transformers northwest of Bldg. 937.

15. Filler pipe to possible xylene UST at northeast corner of Bldg. 937.

16. POL storage at the north wall of Bldg. 937.

17. POL storage at the north wall of Bldg. 937; vehicle inspection ramp to right, groundwater monitoring well in foreground.

18. POL storage at north wall of Bldg. 937; waste oil is transferred to drum using a funnel.

19. Heavy oil staining of ground below vehicle-inspection ramp north of Bldg 937.

20. View east of San Francisco Bay from Bldg. 937; groundwater monitoring well visible at left.

21. Equipment and POL storage in Bldg. 973.

22. Two of three vehicle-inspection ramps north of Bldg. 937; monitoring well visible near base of ramp; heavy oil staining on wall of Bldg. 937 at POL storage area and at waste-oil UST filler pipe (at left of POL).

23. Waste POL west of Bldg. 924.

24. Waste-POL tank west of Bldg. 924.

25. Waste-POL storage behind Bldg. 924.

26. Battery storage inside Bldg. 934.

27. Waste-POL storage in Bldg. 950.

DEH Complex

28. Waste-oil tank behind Bldg. 288; note heavy oil staining on walls of concrete vault and windblown sand around tank.

29. Oil accumulated within vault of tank behind Bldg. 288.

30. POL storage inside Bldg. 268.

31. POL storage behind Bldg. 268.

32. Paint shop, Bldg. 285; note electrical transformers in temporary storage outside the building.

33. Paint washing sink inside Bldg. 285.

34. Waste batteries stored outside Bldg. 285.

35. Inside sign shop, Bldg. 285.

36. Waste-POL storage behind Bldg. 268; chain link fence defines north boundary of PSF.

37. Waste-POL storage behind Bldg. 268; chain link fence defines north boundary of PSF.

38. Waste asbestos behind Bldg. 268.

39. Wash rack between Bldgs. 268 and 288.

40. POL storage inside Bldg. 268.

41. Portable generator, with oil leak, parked inside Bldg. 268.

42. POL storage at east end of DEH complex.

864th Engineering Battalion Motor Pool

43. POL storage area at Bldg. 1351.

44. Some oil staining of pavement adjacent to POL storage area at Bldg. 1351.

45. POL storage area at Bldg. 1351, showing some staining of pavement.

46. 864th Motor Pool, Bldg. 1351.

47. POL in temporary storage outside Bldg. 1351.

48. Wash rack at Bldg. 1351.

49. Waste-POL storage at Bldg. 1351, beside wash rack.

50. Old power house (Bldg. 1398), now used as storage by 864th Engineers.

51. Old power house; note possible UST fill pipe at building wall.

52. Old power house; plumbing leading to UST.

53. Hydraulic lift inside Bldg. 1351.

54. Battery recharging equipment inside Bldg. 1351.

55. Parts-degreasing equipment inside Bldg. 1351.

AAFES Facilities

56. AAFES service station, Bldg. 231.

57. Parking area north of Bldg. 231; darker pavement is replacement over area excavated when USTs were removed.

58. AAFES car wash, Bldg. 206.

59. Vehicle maintenance in Bldg. 231.

60. AAFES gas station, Bldg. 207.

61. Storm drain at AAFES gas station, Bldg. 207.

62. AAFES service station, Bldg. 231.

63. Dry cleaning equipment in Bldg. 228.

64. Dry cleaning equipment in Bldg. 228.

65. Plumbing to possible USTs at Bldg. 228.

66. Extensive plumbing network within Bldg. 228.

67. Dry cleaning equipment in Bldg. 228.

68. Possible fill pipes to USTs at north wall of Bldg 228.

USPHSH Complex

69. Boiler room at Bldg. 1801, posted for asbestos hazard.

70. Abandoned drums in area around USPHSH boiler room, Bldg. 1802.

71. Abandoned drums in area around USPHSH boiler room, Bldg. 1802; note plumbing in wall, possibly leading to a UST.

Miscellaneous

72. Landfill area #4, near Central Magazine.

73. Landfill area #5.

74. Landfill area #8, USPHSH.

75. Landfill area #3, waste-transfer station.

76. Landfill area #3, waste-transfer station.

77. Landfill area #5.

78. Battery Dynamite.

79. Battery Dynamite.

80. Storage building near Battery Dynamite.

81. Incinerator, PHSH, near Bldg. 1820 (no longer operational).

82. Raw water intake at Lobos Creek.

83. Central POL facility.